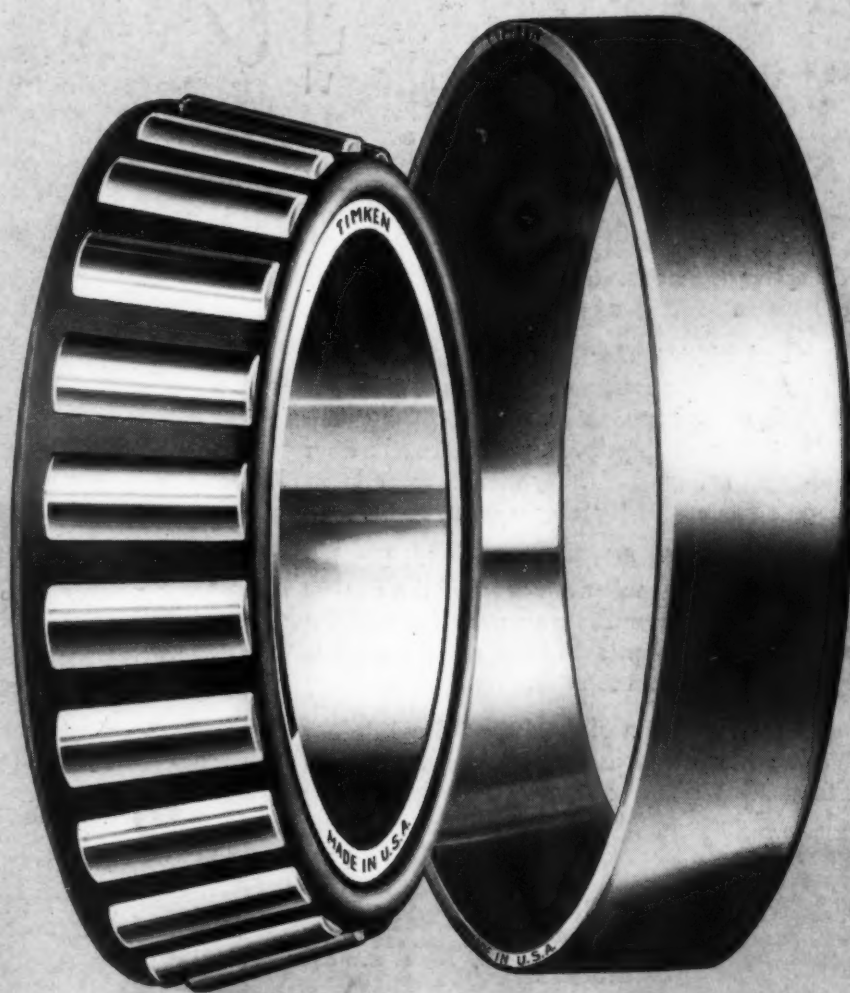


TECHNOLOGY DEPT.

ROADS AND STREETS

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FAST...CLEAN EUCUID DUMPING Cuts Costs



● Fast, non-stop dumping and accurate spotting on the fill are time-saving and cost-cutting features of Bottom-Dump Euclids.

The large, full length and width trailer doors open instantly by gravity—they are unlocked by operation of an air valve on the steering column. Smooth, steep hopper sides of the Bottom-Dump Euclid shed the load quickly and cleanly. Adjustment of the door opening permits dumping the load in long windrows or large heaps on the fill, depending on the job requirements.

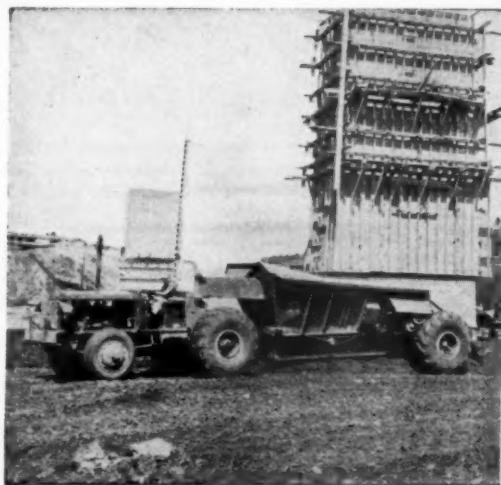
Doors are closed by engaging a driving wheel with the left trailer tire which winds the door cable on a drum of the control assembly. In a short travel distance the doors are fully closed and locked in position—driving wheel of the door control is then automatically disengaged from the tire.

The simple but rugged construction of the famous Euclid door control . . . its reliable performance and long life . . . is typical of Euclid features that result in lower hauling costs for leading contractors and industrial owners. Your Euclid distributor will be glad to provide facts and figures on what Euclids can do for you.

BOTTOM-DUMP EUCLIDS. Capacities of 20 to 32 tons—13 to 42.9 cu. yds., struck . . . loaded speeds from 26 to 34.4 m.p.h. . . . powered by 150 to 275 h.p. Diesel engines.

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The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO



The big, sturdy hopper of the Bottom-Dump Euclid is wedge-shaped to place a large part of the payload on the drive wheels for proper weight distribution and improved traction. The shallow load over the trailer wheels is discharged first, thus maintaining maximum traction on drive wheels until the complete load is discharged from the hopper.



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ROADS AND STREETS

No. 9

SEPTEMBER, 1946

Vol. 89

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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LORAINS LEVEL MOUNTAIN TOPS for West Virginia Airport



9½ MILLION YARD
KANAWHA, W. VA. PROJECT
RUNS 40% ROCK

1¾ yd. Lorain-80 eats its way through a mountain top rock cut.

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Moto-Crane, wielding 4500 lb. skull cracker on over-size rock fragments, eliminates secondary blasting.

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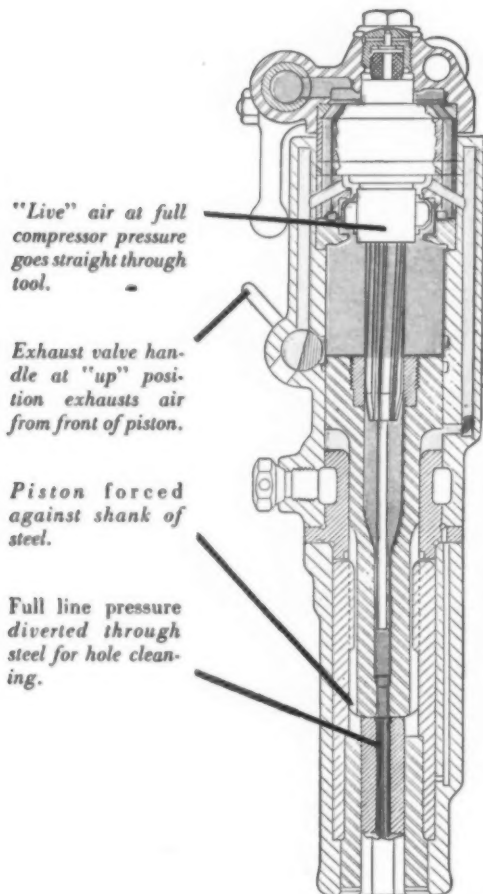
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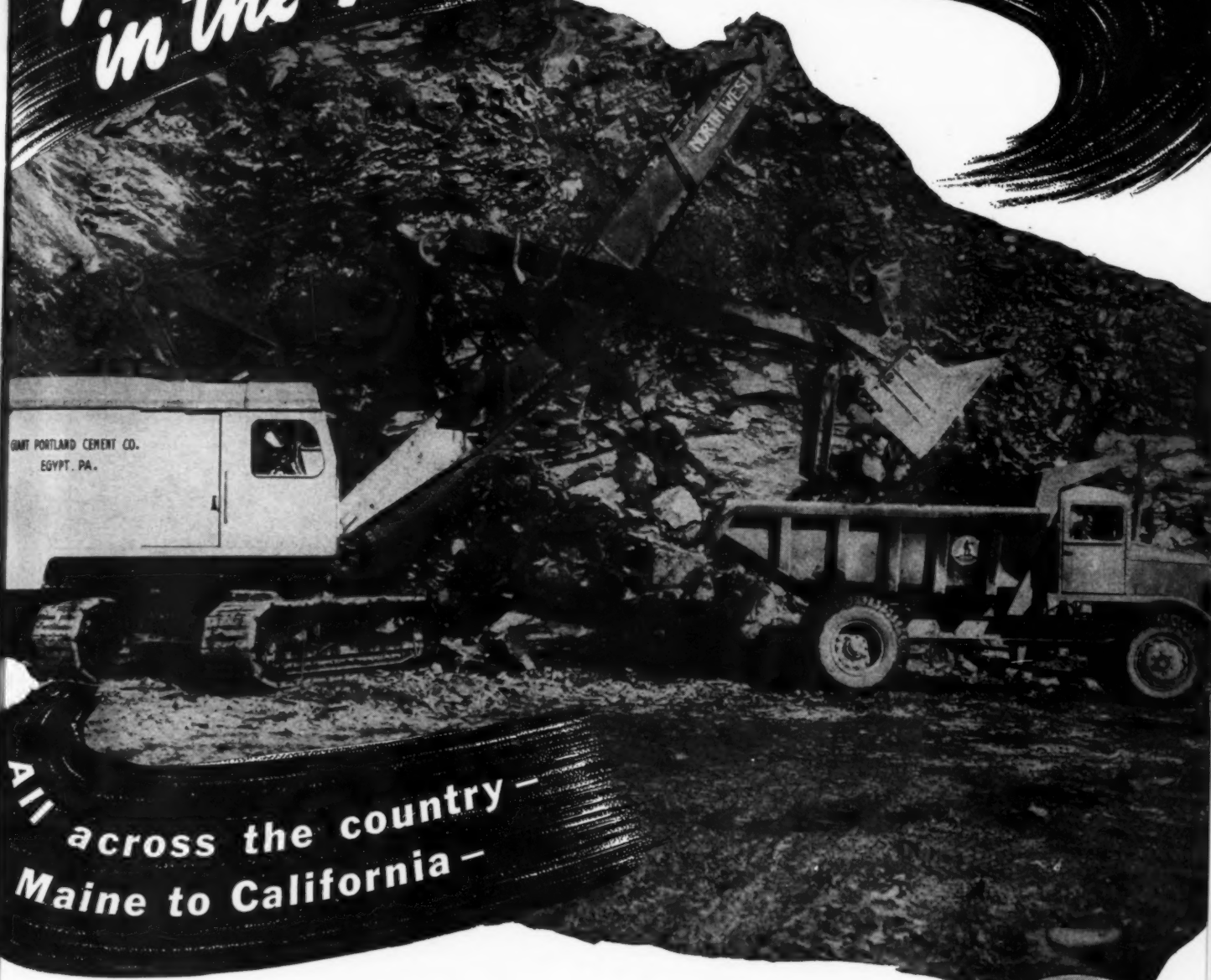
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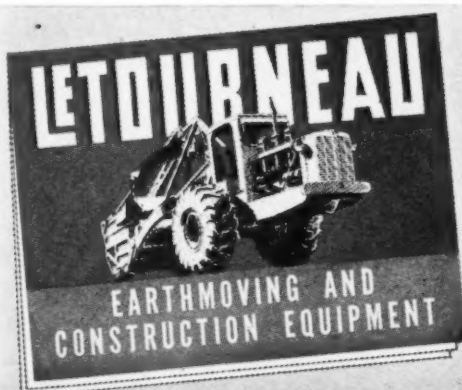
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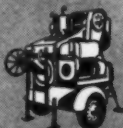
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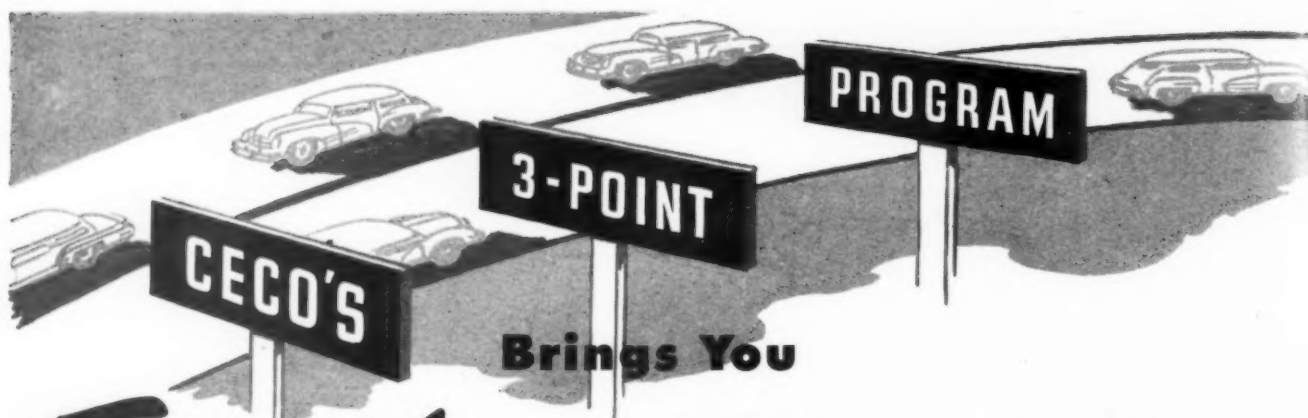


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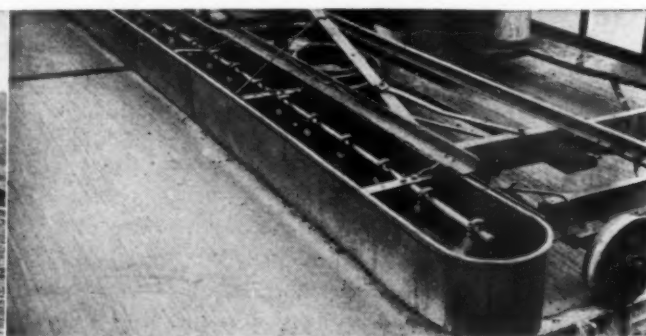
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6. Heavy front axle construction.
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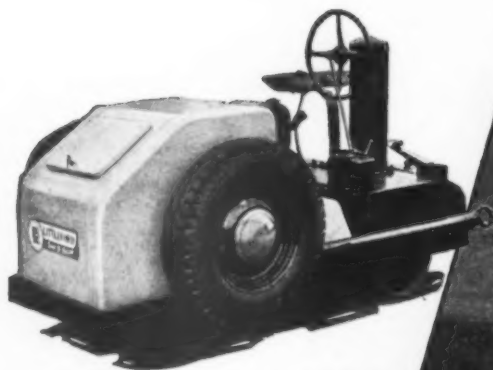
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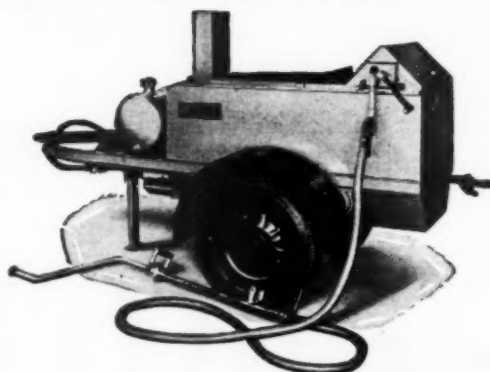


84-HD ASPHALT KETTLE



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1. The scientific curve of the blade rolls the earth ahead instead of shoving it—producing greater capacity and lower yardage costs.
2. With the famous "Caterpillar" Diesel Tractor, this 'dozer is a

matched, perfectly balanced work unit. Tractor and 'dozer are both built by the same experienced manufacturer—both sold and serviced by the same well-equipped dealer.

3. It can be mounted and demounted quickly, with none of the inconvenience of an overhead frame.

4. Extra-hard steel gives the blade edge long, durable life.

5. Cable controls are fast, sure-acting, easy to operate, and cables and sheaves are protected from dirt-clogging.

"Caterpillar" Bulldozers with straight or angling blade are available for the three larger sizes of "Caterpillar" Diesel Tractors and they'll make a lot of dirt fly in the great earthmoving days that are ahead.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

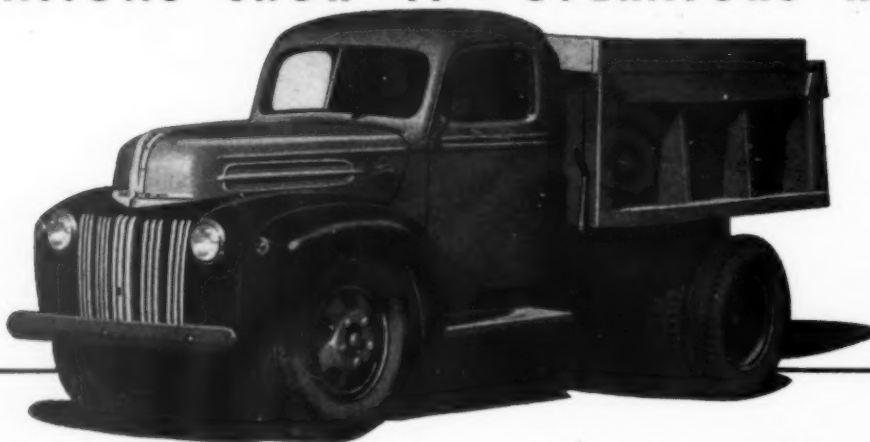


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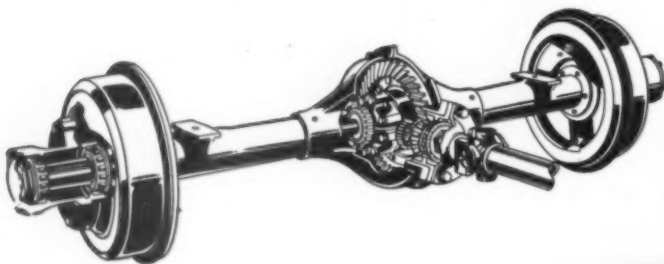
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One big reason —
FORD AXLES STAND UP!



Ford Truck axle shafts carry no weight load, because *ALL* Ford Trucks have $\frac{3}{4}$ -floating or full-floating axles. All weight stresses are carried on the axle housing—none on the shafts—minimizing shaft breakage. Driving pinion is straddle-mounted on 3 large roller bearings, maintaining positive mesh with ring gear—no destructive springing away under stress. Differentials have 4 sturdy pinions, even in light duty chassis, spreading the load and strain.



ONLY in a Ford Truck will you find all these long-life features: your choice of two great truck engines, the 100-H.P. V-8 or 90-H.P. Six—triple-life Silvaloy V-8 rod bearings—Flightlight aluminum alloy, 4-ring pistons—efficient air- and oil-filtering—full pressure lubrication—heavy channel section frames, *doubled* between springs in heavy duty models—semi-centrifugal clutch—big hydraulic brakes, with non-warping, score-resistant cast drum faces for maxi-

mum life. More than 50 such long-life features contribute to Ford Truck endurance . . . and that endurance is proved by the fact that 7 out of 11 of all Ford Trucks built since 1928 are still in use. See your Ford Dealer!

FORD TRUCKS

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE



LIKE A WATERFALL MATERIAL FLOWS IN A STEADY STREAM FROM UNIVERSAL "STREAM-FLO" ROCK AND GRAVEL PLANTS

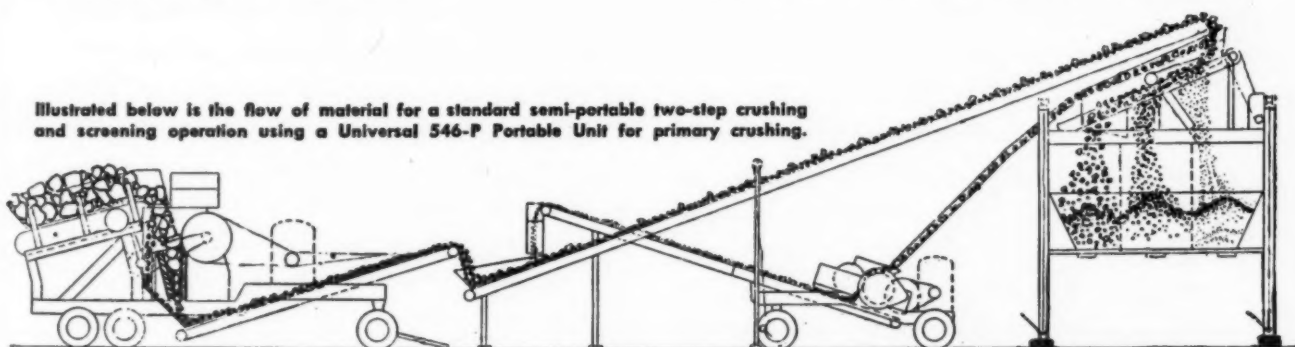


THE UNIVERSAL 546-P PORTABLE PRIMARY CRUSHING UNIT

Built to stand up under high speed production, the 546-P Primary Crushing Unit steps up the output of any secondary crushing plant. It can be used to convert your gravel plant to handle rock, or to increase the efficiency of your rock plant by eliminating sledging or pop shooting of large oversize.

The 546-P provides a steady stream of ideal sized material. When teamed up with a gyrating screen and a Universal Pulverizer, it produces unbelievable quantities of aglime with remarkable economy. Easily moved from job to job, the 546-P meets today's production needs of highest capacity at lowest cost.

Illustrated below is the flow of material for a standard semi-portable two-step crushing and screening operation using a Universal 546-P Portable Unit for primary crushing.



More and more cost-wise operators are profiting with the 546-P. For complete information see your Universal distributor or write for Bulletin No. 56.

UNIVERSAL

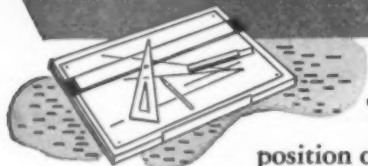
ENGINEERING CORPORATION

631 E. Ave., N. W., Cedar Rapids, Iowa

ROCK, GRAVEL AND LIME CRUSHING PLANTS • CONVEYORS
SCREENING OR WASHING PLANTS • APRON FEEDERS



BUILT TO TAKE IT AND COME BACK FOR MORE



THE DOMINANT position of International Trucks in the heavy-hauling field results from just one thing—performance.

And the *performance* of International Trucks results from the way they are designed, engineered and built—plus more than 40 years of truck manufacturing experience.

Of great importance is the fact that new improvements and features are incorporated in Internationals as fast as they are proved worthy—without fanfare or boasting.

The result is that Internationals are con-

stantly in the process of being better designed, better engineered and better built. And that means performance dividends for current purchasers.

No matter what your truck transport problem, there is an International to do the job, because the International Line is *complete*. Service facilities are unsurpassed, both from International Branches, the nation's largest company-owned truck-service organization, and thousands of International Dealers.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois



Tune in "Harvest of Stars" Every Sunday—NBC Network. See newspapers for Time and Station

INTERNATIONAL TRUCKS



T7 TRAXCAVATOR building a county road in New York State. (Insert) Another Model T7 ripping and loading old pavement in Illinois.

ROUGH grading for new roads and tearing up old pavement are only two of the many tasks TRAXCAVATORS do well on road and street building programs. For these versatile machines also clear right-of-way, strip overburden from gravel pits, excavate borrow material, load excess dirt from shoulders, load sand, gravel and crushed stone, backfill culverts and bridge approaches, do draw-bar work and many other jobs. Their

ability to dig, grade, load and carry makes them the most useful equipment on the job. TRAXCAVATORS are built in several sizes for every job and purpose with bucket capacities from $\frac{1}{2}$ to $2\frac{1}{2}$ cubic yards. Get the profit-winning story of TRAXCAVATOR versatility from your TRACKSON-"Caterpillar" dealer today, or write for informative literature to TRACKSON COMPANY, Dept. RS96, Milwaukee 1, Wisconsin.



When writing advertisers please mention — ROADS AND STREETS, September, 1946

Building a Highway.. Flight Strip..Airport?



**Get all the Hot
Material You Need —
Fast at Low Cost with
a Cleaver-Brooks
Portable Booster**

THE big opportunity to show how Cleaver-Brooks Portable Boosters make quick work of auxiliary airports, emergency landing fields and strips came when they were put to use in meeting vitally important "RUSH" war assignments.

Hundreds of these boosters were on the job heating the oils and bituminous materials as needed. Construction crews were not delayed . . . flight strips and airfields grew seemingly over night.



Write On Your Business Letterhead . . .
For the Bituminous — mix Calculator — a
ready reference slide rule showing weight
of mix needed in lbs. and tons in relation
to width and depth of area to be covered.



Cleaver-Brooks Boosters circulate and pump oils and bituminous materials while heating (approximately three times faster than is possible with steam) to a wide range of application temperatures as required on the job.

Bituminous boosters were pioneered by Cleaver-Brooks. They are in nation-wide use for airport and road construction and maintenance. They are without equal in speed and economy. Write for complete information.

CLEAVER-BROOKS COMPANY
5106 North 33rd Street, Milwaukee 9, Wisconsin

Cleaver-Brooks

**TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . .
AUTOMATIC STEAM-PLANTS**

the best advertisement
for a Carrimor^{*}
 is a competitive test!



COMPARE THE RESULTS OF THIS TYPICAL
 TEST BY AN UNBIASED ORGANIZATION*

Test Data	LPC Carrimor	Scraper "A"	Scraper "B"
Struck Capacity	8.4 yds.	8.2 yds.	9.25 yds.
Loading Time	1.0 Min.	1.0 Min.	1.0 Min.
Spreading Time	.157 Min.	.172 Min.	.366 Min.
Turning & Travelling time considered as constant for purposes of computation	3.22 Min.	3.22 Min.	3.22 Min.
Total Trip Time	4.38 Min.	4.39 Min.	4.58 Min.
Weighted yds. per trip	7.3	6.1	6.0
Trips per 54 Minute Hr.	12.32	12.30	11.7
Total Yds. per Hr.	89.9	75.0	70.2
Total Yds. per 8-hr. Day	719	600	562

*Name on request

Claims are easy and talk is cheap but if you want the real facts on which scraper *will put the most money in your pocket*, we suggest a competitive test with the new 8 yard LaPlant-Choate Carrimor.*

For example, here are the results of a typical test, conducted by an unbiased organization with no connection with any scraper manufacturer. Every condition was carefully controlled to get as nearly a perfect comparison as possible—same operator, same material, same tractor, same haul and *even the same loading time*. But look at the difference in scraper production, based on actual weighed loads at the fill! At 25 cents per yard, the LPC Carrimor* would earn \$29.00 per day more than scraper "A" and \$39.00 per day more than scraper "B".

With an opportunity for extra profits like these, isn't it worth waiting a little longer to be sure of a Carrimor*—the scraper that's "best by competitive test." LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.
 *Reg. U.S. Pat. Off.

LaPLANT - CHOATE
Job-Proved Equipment... for Lowest Possible Cost
 in Moving Earth



GM "Quad 6"

For Great Diesel Power take a cue from the Oil Fields

WHY are more and more drillers turning to General Motors Diesel engines?

Drilling for oil is 24-hour-a-day work, so an oil man's power has to be dependable.

It has to be able to take on increasing loads as the well gets deeper. It has to be reliable and require the minimum of maintenance. And it has to be portable.

GM Diesels fill all the oil-drillers' musts—then give them more. They are compact and powerful. They can be moved into a job fast and out again when it's done.

So whatever needs for power you may have in road-making machinery, cranes, shovels or any other construction equipment—look to GM Diesels.



Features of GM Diesels Important to Every User of Power

- QUICK TO START**—on their own fuel
- LOW COST**—run on common fuel oil
- EASY TO MAINTAIN**—clean design plus accessibility
- LESS FIRE HAZARD**—no volatile explosive fuel
- COMPACT**—readily adaptable to any installation
- SMOOTH OPERATION**—rotating and reciprocating forces completely balanced
- QUICK ACCELERATION**—2-cycle principle produces power with every downward piston stroke

DETROIT DIESEL ENGINE DIVISION

DETROIT 23, MICH. •

SINGLE ENGINES... Up to 200 H.P.
MULTIPLE UNITS... Up to 800 H.P.

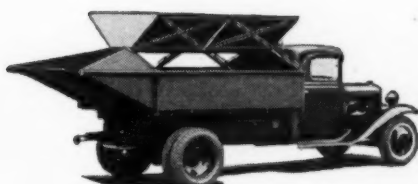
GENERAL MOTORS

The BEST COSTS LESS

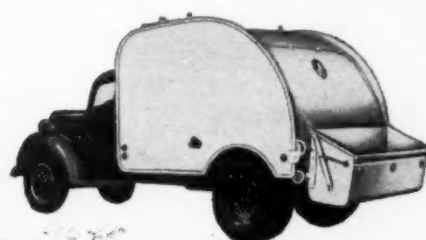
For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.



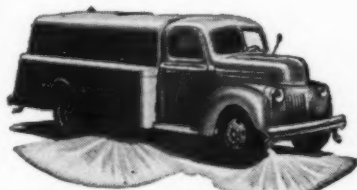
The Load Packer (patented) all enclosed garbage and refuse unit. Compresses loads hydraulically for maximum payloads.



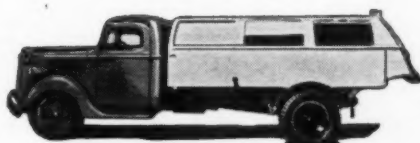
Type C28 scow and Garbage Body. Steel hinged covers extra equipment.



The new Bucket Loader, an all enclosed sanitary refuse disposal unit.



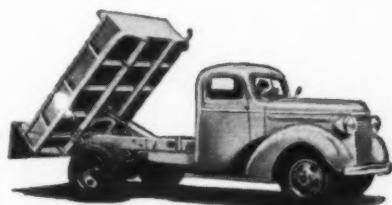
Street Flushers and Sprinklers.



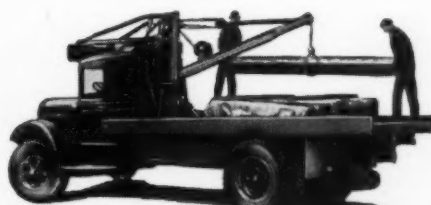
Type C50 Garbage Body with sliding steel covers on each side.



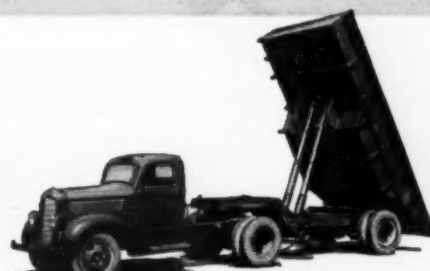
Model "QD" Tree-moving Crane. Easily erected or removed from all purpose stake body.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.



Telescopic boom Crane. Boom radius 8 to 20 feet.



Special W28 Garbage Body, watertight top box. Capacity 7 cu. yds. Type T333 telescopic Hoist.



GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST.

DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: • TRUCK TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

Pit material used for roadbed treatment and detour road topping was quickly dumped by the Mississippi Wagons in accurate windrows.



A Mississippi Wagon takes on its 10-yard load at the gravel pit, six miles off the highway.



Rolling fast over the long lead-in road, the Wagons averaged better than 20 m. p. h. for each round trip.



MISSISSIPPI WAGON

MISSISSIPPI WAGONS

Cut Time and Cost of Hauling on Texas Highway Job

THE H. E. WILLIAMS COMPANY, of Waco, Texas, used a fleet of ten Mississippi Wagons for the long-distance hauling of 78,000 yards of pit gravel, in the reconstruction of six miles of Texas Highway No. 6, south of Waco.

Needed for both roadbed treatment and detour road topping, the gravel had to be moved from a pit six miles off the highway, over a haul route averaging 9.5 miles to the dump and 10.5 miles return.

Carrying 10-yard payloads, the ten Mississippi Wagons moved an average of 1,000 yards a day over the rough, rolling haul road. Each Wagon averaged ten 20-mile round trips per 10-hour day, covering each round trip at an average of over 20 m. p. h.

Records of the H. E. Williams Company on this job show a total cost for hauling with Mississippi Wagons of 34.3¢ per yard, or 3.6¢ per yard-mile, including reserves for depreciation, parts and tires.

"This figure," says Mr. Williams, "is very pleasing to us, as it is considerably lower than the best records of hauling equipment previously used by us on similar work. We are also well satisfied with the general performance of our Wagons—their ease of handling, superior flotation on soft ground, and efficient operation both on and off the highway."

The ability of Mississippi Wagons to move yardage fast and cheaply is being demonstrated every day on jobs all over the country. Ask any owner what he thinks of Mississippi Wagons—then ask your nearby distributor for facts and figures on what Mississippi Wagons can do for YOU.

●
M-R-S MANUFACTURING COMPANY
Jackson, Mississippi, U. S. A.

When profits depend on low-cost hauling... You can depend on **MISSISSIPPI WAGONS!**



The World's Most Modern Hauling Unit



We asked the snow-removal and here's how they say



CARL D. WARNER,
*Supt. of Sanitation,
Detroit, Mich.*

"One of our best time and money savers is . . . rock salt; we've had more than seven years of experience with it, and we rely on it so heavily that during an average winter we spread it on our streets about 35 times. Applied immediately at the beginning of a storm it, plus traffic, does 80 per cent of our snow and ice removal job and gives local motorists dry, snow-and-ice-free streets from curb to curb all winter long."



EDWARD F. MORGAN, Jr.
*Superintendent of Streets,
Hudson, Mass.*

"Efficient handling of available equipment plus the extensive use of rock salt as a snow and ice remover in place of manpower has enabled us to save money and keep open our many miles of paved and unpaved streets. Rock salt is less expensive to use than sand, fewer men are needed to apply it, and generally, one application is enough. Added to all this, it doesn't have to be dug out of the sewers in the spring."



and "SALTY" says-

"Remove snow and ice! Don't treat it!"

Treacherous ice and packed snow on traffic arteries mean accidents, injuries...death! "Treating" these hazards with abrasives accomplishes only temporary results.

Quick, effective removal of snow and ice with Sterling "Auger-Action" Rock Salt gives a bare, dry pavement . . . the safe driving surface.

But it's of utmost importance that you estimate your requirements now . . . and plan your needed storage . . . to be sure you have *enough* on hand for severe continuing storms. Order your Sterling Rock Salt—*today!*

Get the full facts in our new 1946 bulletin! Fill out and mail the coupon for your free copy. *Now!*

INTERNATIONAL SALT COMPANY, INC.

Dept. RS-9, Scranton, Pa.

Gentlemen:

Kindly send me free of charge and at once a copy of "Why, When and How To Apply Sterling 'Auger-Action' Rock Salt."

Name _____

Title _____

Street _____

City _____ State _____

experts to write this ad...

"PASS the SALT"



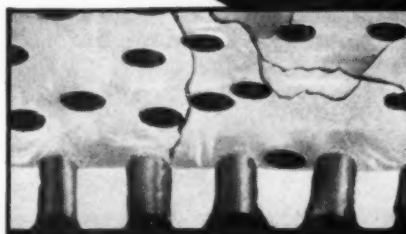
FRED HAMMERLE,
County Engineer,
Butler County, Ohio

"We spread Sterling Rock Salt at the beginning of a storm, especially at the places our men know from experience to be dangerous, because it keeps snow mealy and prevents ice from forming and bonding to the pavement. This makes ice and snow removal easy, and enables us to save money on plowing costs."



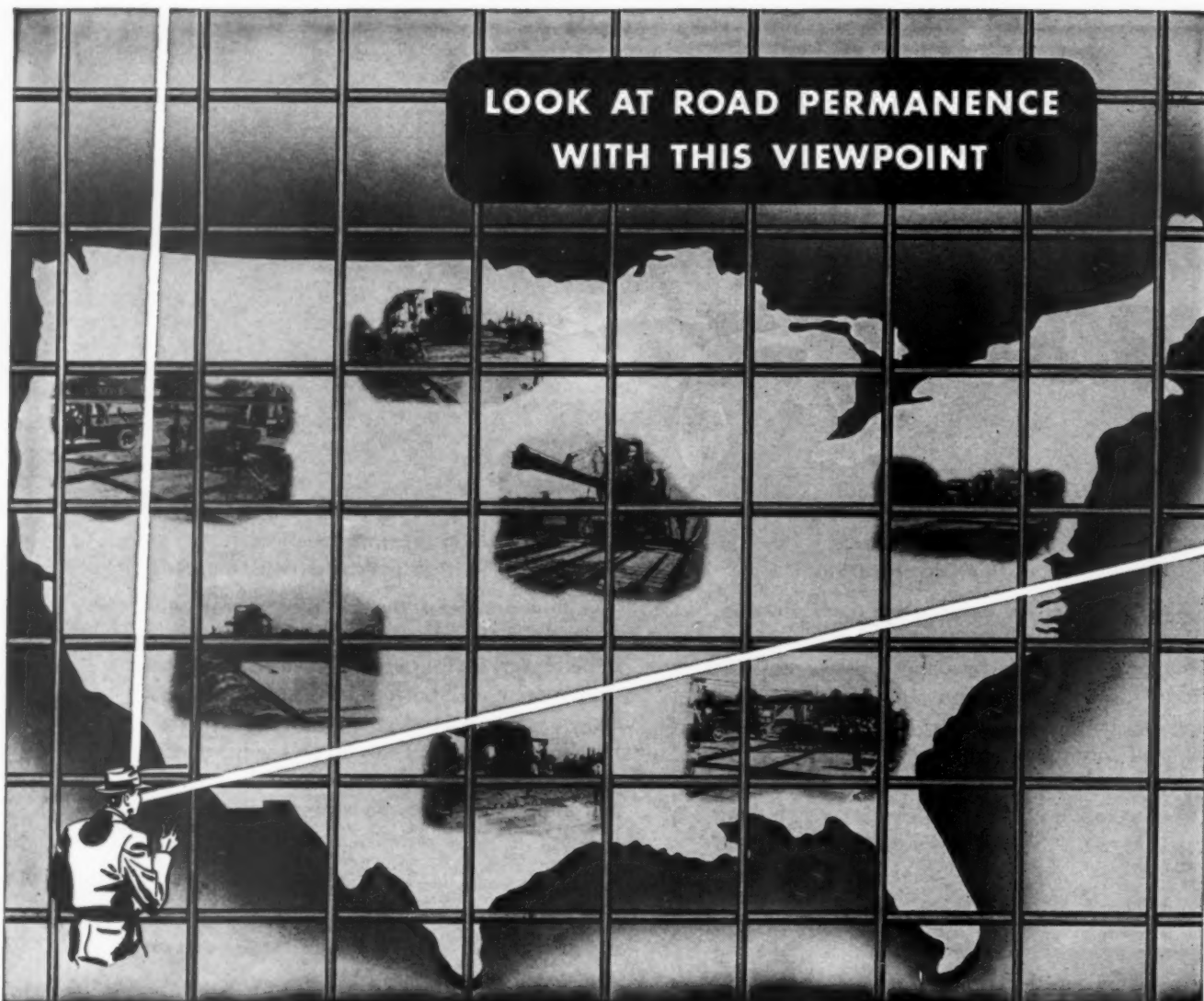
ANTHONY MARTINI,
Superintendent of
Public Works, Passaic, N. J.

"We now practice snow and ice removal—with rock salt—rather than just treatment. It pays off in better service for our motorists and less work for us—no more laborious hand chopping to get the ice off. And rock salt will keep snow from bonding to the pavement when the next snowfall hits and give some protection to pedestrians and motorists before our equipment goes out."



- ★ Assures quick removal
- ★ Saves labor and equipment
- ★ Makes driving safe





ALL OVER THE MAP—TRUSCON WELDED STEEL FABRIC IS PROVING THAT

Steel Builds Roads that Endure!

Steel and concrete have proved their special worth in millions of miles of highways. At every point of the compass . . . under every conceivable condition of weather . . . Truscon Welded Steel Fabric Reinforcement, and other specialized Truscon roadbuilding products, are assuring long-life concrete pavements.

Engineers and designers have found by experience, practice and research that the following advantages can be expected from Truscon Welded Steel Fabric Reinforcement:

Provides resistance to cracking due to shrinkage of concrete during setting period.

Provides tensile strength necessary

to resist subgrade friction caused by expansion and contraction of the concrete slab due to temperature changes.

Provides increased resistance to cracking of concrete due to warping under load.

Provides resistance to the development of microscopic cracks into visible cracks.

Provides resistance to cracks opening and allowing the entrance of water.

Provides resistance to broken ends of slabs separating at a crack.

Decreases spalling and progressive disintegration of the concrete.

When you plan roads, plan them well. Use structural designs that have been proved the most economical, durable and serviceable in the *long run*. Use Truscon Welded Steel Fabric with other associated Truscon roadbuilding products, and assure lasting prestige for you and more permanent highways for the communities you serve.



TRUSCON
Steel Company

YOUNGSTOWN 1, OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

QUESTION:



What is My

BEST BUY

For

Low Cost

Maintenance?

ANSWER:

A HUBER MAINTAINER

BECAUSE

— for a single major investment, a Huber performs the eight most important operations in maintaining roads, streets and airports.

— It functions as a maintenance, mower, bulldozer, lift-loader, patch roller, V-type or one-way snow-plow, or rotary broom.

— It is the most modern, economical, and versatile contribution to low cost maintenance in ages.

— It only requires one man to operate.



Take a look at Huber's "One-Man-Maintenance-Crew" at the very first opportunity. There is much to be learned from your dealer.

THE

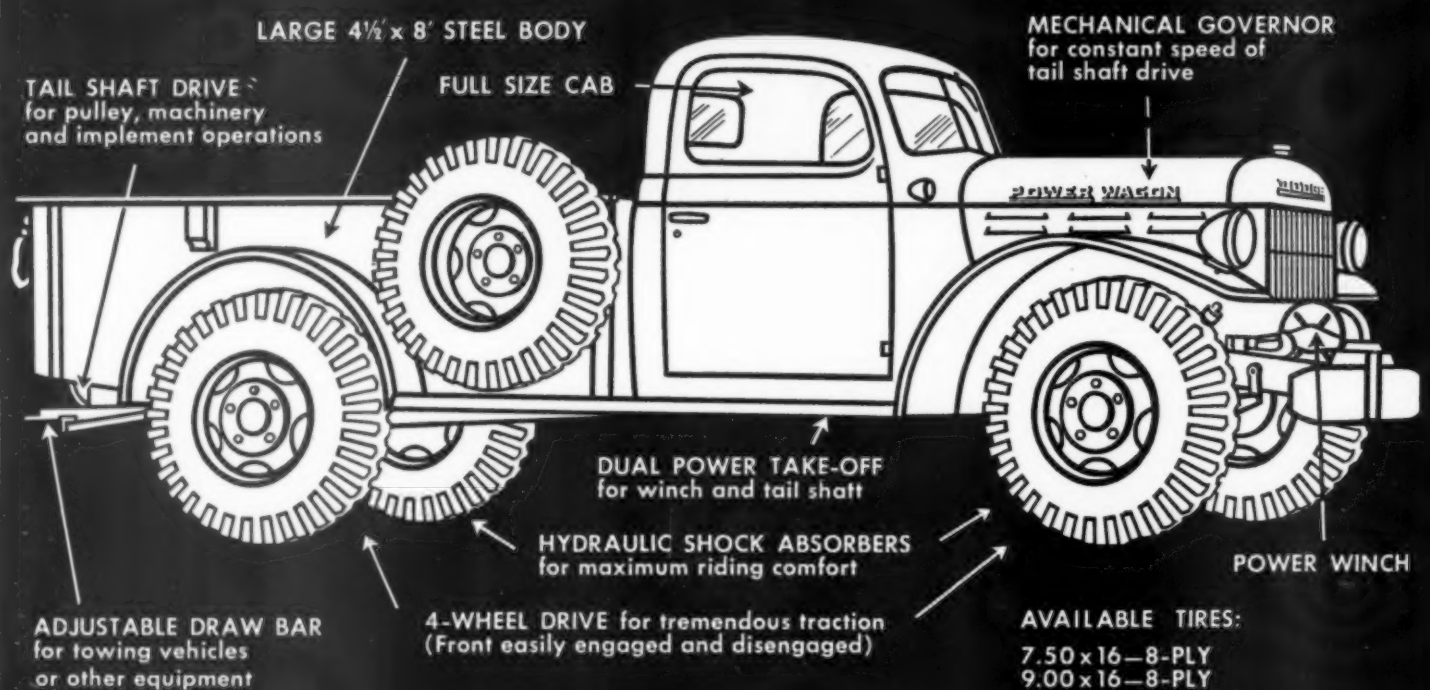


MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER MAINTAINER
ALSO 3 WHEEL AND TANDEM ROLLERS

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DODGE ANNOUNCES THE POWER



Carries welding equipment, shot drills and other machinery on oil fields.

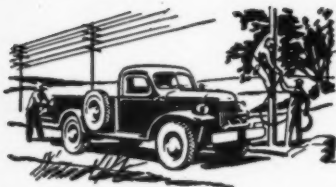


Its powerful winch elevates heavy materials in logging and other industries.

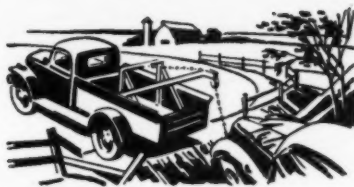


Quarries, mines and gravel pits find plenty of uses for its power and traction

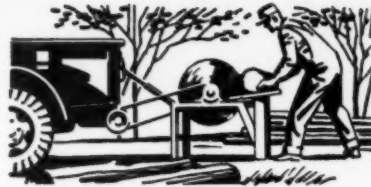
ONLY DODGE BUILDS "Job-Rated" TRUCKS!



Public utilities call it the most versatile vehicle in their fleets.



Its power and traction make it the ideal "wrecker's" car.



Its portable power plant (pulley or shaft drive) is always available.

POWER WAGON

It's a "FULL SIZE" truck for jobs no other truck can do!

Here's the truck that needs no roads . . . the new and remarkable Dodge Power-Wagon. It's the kind of truck you've hoped someone would build some day.

It's a *full size* truck! It has a full size *body* for your loads. It has a full size *cab* for your comfort. It has full size *power* to go places and do things other trucks can't do.

With four-wheel drive, you can cross fields, plow through deep sand or mud, cross streams and climb tough, rugged hills.

With dual power take-off, it's a "power-house" on wheels. Heavy loads can be hoisted or

pulled with a front-mounted power winch. From pulley-drive and tail shaft you can saw wood, grind grain, and operate a wide variety of machinery and equipment.

Like all Dodge trucks, the Power-Wagon is *Job-Rated* . . . engineered and precision-built to fit the job . . . to save money on the job . . . and to last longer.

Chances are that *you* have a job that the Power-Wagon can do *better* than any other vehicle. See your Dodge dealer now. See the Power-Wagon. See what it can do for you on your job.

DODGE DIVISION OF CHRYSLER CORPORATION

POWER-WAGON FEATURES

Six-cylinder, 94-H.P.
Job-Rated Engine.

Four-wheel Drive (Disengagement for rear wheel drive).

Full Floating Front
and Rear Axles.

Heavy-duty, double-acting
Shock Absorbers.

4-speed Transmission—2-speed
Transfer Case (8 Forward

Speeds—2 Reverse Speeds).
High Traction Tread Tires.

AUXILIARY EQUIPMENT

Power Take-off • Power
Winch • Pulley-Drive •
Tail Shaft • Draw Bar,
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and Pintle Hook

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7920 Joseph Campau Ave., Detroit 11, Michigan

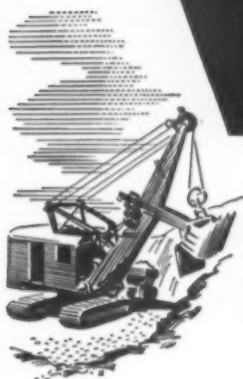
Please mail me
available literature
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describing The
POWER-WAGON.

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TYPE OF BUSINESS.....
ADDRESS.....
CITY AND STATE.....

For Longest and Best Service...



UPSON-WALTON LAYRITE (PREFORMED) ROPE



WHEREVER installation and maintenance costs are high (and that is practically everywhere) U-W Layrite wire rope can help lower them. And in almost every case where wire rope is used, Layrite will do a better job.

For rotary drilling lines...mining machine ropes...all kinds of earthmoving and excavating machinery...grab buckets, shaft hoists, cargo falls—the instances where Layrite does a better job are as broad as all industry.

Because every single strand in a U-W Layrite rope is *performed* to the shape it will take in the rope before it ever comes in contact with another strand, Layrite is a *permanent* rope; it's been constructed to hold its shape until the wires themselves wear out; it is safer and easier to handle . . . consequently it saves valuable time on the job in installation and saves expensive maintenance where shorter-lived rope would require re-rigging.

For best service on any job, specify *U-W Layrite Performed, Perfection Grade*.



Established 1871

*All Upson-Walton Products Available
Through Your Local Upson-Walton Distributor*

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THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

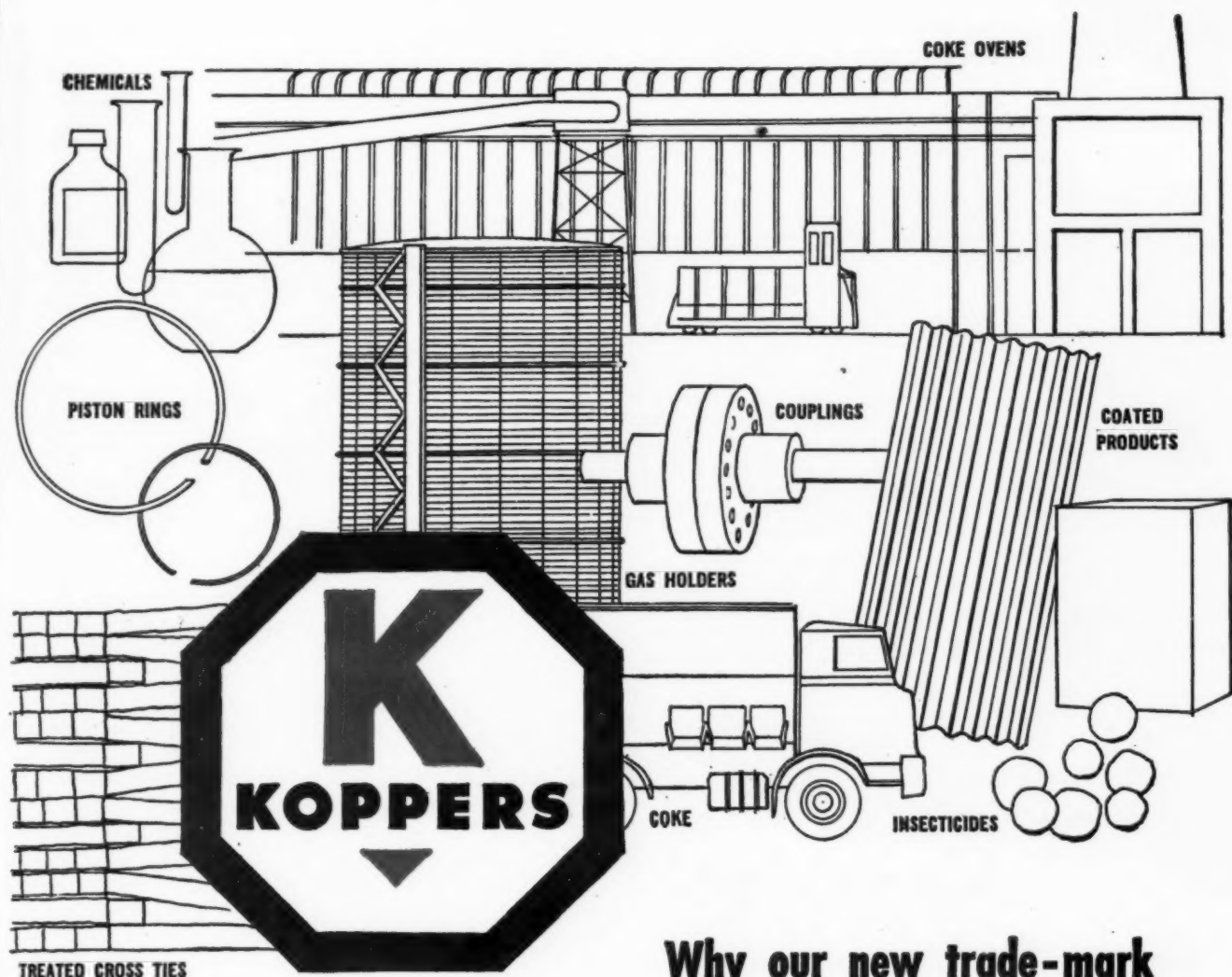
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241 Oliver Building
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Why our new trade-mark is important to you

Every day, you place your health, your safety, your children, even your life at the mercy of manufacturers whose products you trust.

Often you do it because of some small mark which doesn't actually say anything in words, but which says volumes in the meanings you read into it.

That's what trade-marks mean to the American people. In effect, the trade-mark says, "Here is a manufacturer who is so sure of this product that he puts his name on it."

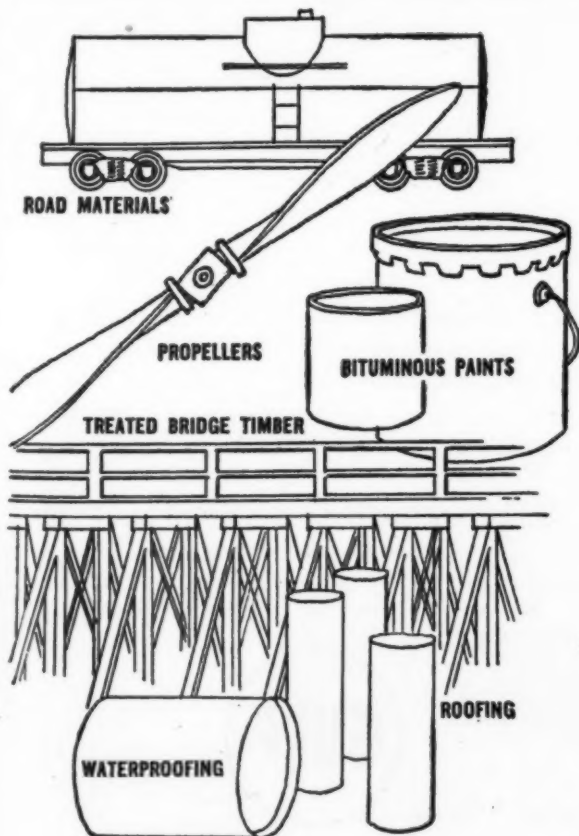
That's why our new Koppers trade-mark is important to you.

There are dozens of Koppers products; there will be dozens more as opportunities expand in the rapidly growing chemical field.

Often you will not be able to see the Koppers label on those products—you can't see it, for example, on road paving material or on a bottle of medicine—but the roadbuilder sees it and the medicine maker sees it, and their confidence in it is your safeguard.

Koppers also is well known as a dependable source for many other products and services which we furnish directly, such as the design and construction of coke ovens, roofing material, piston rings, couplings, propellers for your private plane, coke for your furnace, moth balls for your clothes, paints, pressure-treated wood and scores of others.—Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pa.

KOPPERS—THE INDUSTRY THAT SERVES ALL INDUSTRY





"Gulf Quality Products and
*prompt delivery
service*

help us get better all-round
job efficiency"

says Supt. John L. Dugan

*Fred Berlanti and Son, Inc., of Harrison, New York, has just completed an important project on U. S. Route 22 near Phillipsburg, New Jersey. This \$700,000 job included approximately 100,000 cu. yds. of rock and earth excavation, 55,000 sq. yds. of 10" concrete pavement and 2 bridges.

"**P**ROPER lubrication with Gulf quality oils and greases helps keep all of our equipment in good condition—and Gulf's prompt delivery of lubricants and fuels helps us avoid delays," says Superintendent John L. Dugan of Fred Berlanti and Son, Inc.* "We're satisfied that we get more work-hours from every unit of equipment and better all-round job efficiency by dealing with Gulf."

For some years now, there has been little allowance in most contracts for breakdowns and delays caused by mechanical troubles. That's why many leading contractors have formed the habit of using Gulf quality lubricants and fuels as basic profit insurance. They know that Gulf products help effectively to keep equipment on the job—and operating at top efficiency.

Write, wire, or phone your nearest Gulf office today and arrange to use Gulf higher quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses in 30 states from Maine to New Mexico.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo



Now!

A Lower Cost, Self-Propelled Traveling Mixing Plant



WOOD ROADMIXER *Model 36*

Facts

Rubber Tire Mounted—One-Man Operated—Five forward and five reverse road speeds, 2 to 14 miles per hour, for self-transportation to and from jobs—Five mixing speeds 11.5 to 71 feet per minute—Will handle 4 cu. ft. windrows—Power controls—Super traction for soft sub-grade—Ample power for all operations.

As easy to operate and maneuver as a motor patrol. Made to order for such small jobs as shoulders, stock piles, parking areas, and detours, yet plenty of capacity for any size job. Handles road oil, cut-back, tar, emulsion, and soil-cement mixes. Uses native or imported materials and produces 100 to 150 tons per hour of ready-to-spread mix.

In fact, the Model 36 incorporates all of the proved features of the famous Wood Roadmixers, Models 48 and 54, plus maneuverability, speed, and self-propulsion.

Get all the facts on this sensational new self-propelled Roadmixer today. See your local Wood Roadmixer dealer or write direct to the Wood Manufacturing Company.

Ask for Bulletin Thirty-Six

WOOD MANUFACTURING CO.

BOX 620, 6900 TUJUNGA AVE. • NORTH HOLLYWOOD, CALIF.

When writing advertisers please mention — ROADS AND STREETS, September, 1946



Tomorrow's earthmoving costs will be lower— **thanks to Heil Pioneering**

Soon our huge national road-building program will be in full swing. Competition for jobs will be keener — costs will have to be lower.

Heil engineers have always found new ways of moving dirt faster and cheaper. It meant pioneering which

built up a tremendous backlog of experience. This "know-how" is your assurance that the new Heil earthmoving equipment of tomorrow will be the last word. Let's look at a few Heil cost-cutting developments that have been proven in world-wide service.

EXCLUSIVE HEIL DEVELOPMENTS



THE HYDRO STEER

means full hydraulic steering — it is not a booster. Even in heavy going or on rough construction roads, this compact, reliable unit provides passenger-

car steering for powerful Heil Hi-Speed Tractors. Such easy handling reduces operator fatigue — it is responsible for faster trips and lower costs.



**HEIL BOTTOM
DUMP WAGONS**

are the only wagons that have side-opening dump doors. Opened by cable, these doors work on the clam shell principle. They close by gravity and hold the load tightly because of their balance on the

trunnions, their interlocking gears, and the cross-locking, shock-plate hooks—the cables are slack. Since these doors swing up out of the way, they can't drag. Dumping is faster and maintenance costs lower.



HEIL CABLE SCRAPERS

have many unique features. The bowl design is different. It permits the loading of 15% more material in the same length of time with the same drawbar horse power—there are no voids. The draft point is located behind and above the cutting blade, for better digging.

When the blade encounters resistance, the rear wheels tend to raise, producing a leverage action that forces the blade into the ground. The digging ability of Heil Cable Scrapers, the larger loads they carry, and their fast dumping action mean greater profits.

Heil has many new developments to offer. When your time comes to buy new earthmoving equipment, bank on Heil experience and engineering facilities. You will speed up your jobs, have less trouble, and make more money.

11-72

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

A basically different, specially reinforced oil accepted by leading engine manufacturers as a superior lubricant.



RESISTS SLUDGE FORMATION REMOVES HARD CARBON REDUCES WEAR

Nature and science combine to make Naturalube D. H. D. the finest oil you've ever used, for special Lion processing of this basically different crude oil provides extra resistance to the formation of sludge and lacquer—the effects of heat and oxidation.

From Nature, Naturalube D.H.D. gets a tougher protective film... natural solvent properties that en-

able it to remove hard carbon... greater ability to *penetrate* to all moving parts of an engine and *adhere* to those parts even when engines are idle...and non-corrosiveness.

Ask your local Naturalube distributor about D. H. D. or write direct to Lion Oil Company, El Dorado, Arkansas.

For normal service, where D. H. D. is not required, use Naturalube Motor Oil (not so heavily reinforced).

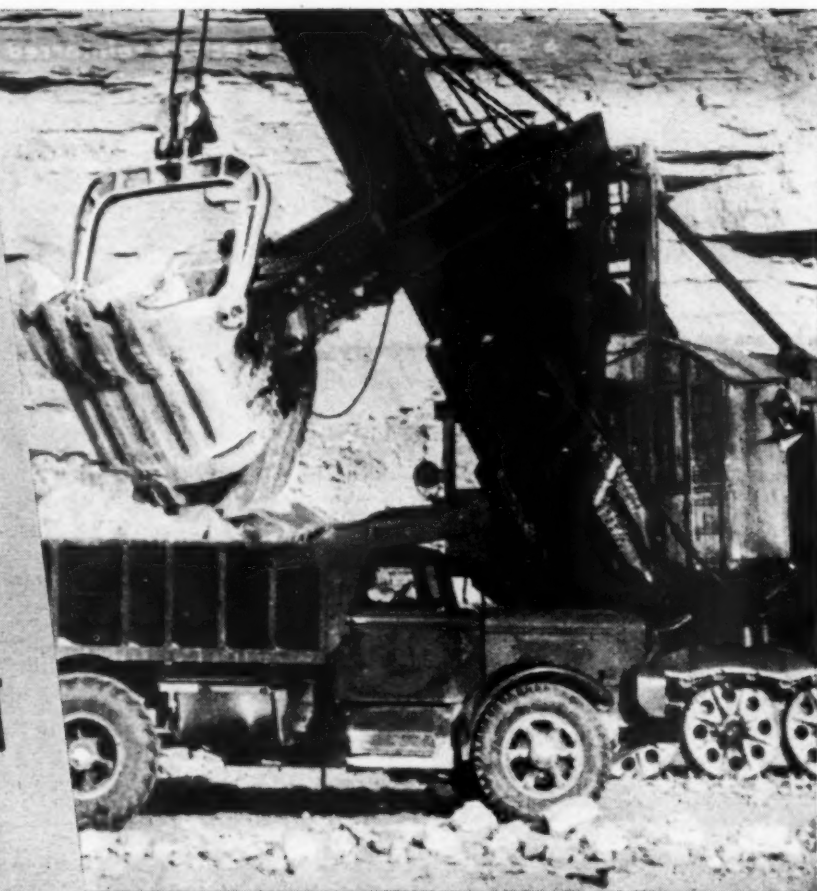
Naturalube D. H. D. is supported by a positive money-back guarantee of satisfaction. If you don't believe it is the best oil you've ever used, Lion Oil Company will return your money.



LION OIL COMPANY

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ARKANSAS

**FOR
SAFE
SUSTAINED
OPERATION
UNDER
LOAD . . .**



Made especially for this kind of service ↗

SINCLAIR OPALINE TBT MOTOR OIL

Under continuous, heavy load conditions greatest operating efficiency can be expected only when motor oil is made specifically to meet extra requirements.

Sinclair OPALINE TBT MOTOR OIL is built for *extra-duty* service. It is manufactured specially to combat oxidation, gum, varnish, carbon deposits. It protects against bearing corrosion. Detergent and dispersal properties also contribute to keeping the engine clean.

Let our engineers analyze your operating conditions. OPALINE TBT may be the oil to solve your lubricating problem.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

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"Moves Peak Pay Loads at Rock Bottom Cost"



The true measure of a truck's value is its ability to transport maximum payloads—*where you want them, when you want them—at minimum cost.* Unless your trucks perform all of these functions, *efficiently, reliably,* they are not giving you full value for your money.

Marmon-Herrington *All-Wheel-Drive* Trucks do give you your full dollar's worth—*because they never let you down. All-Wheel-Drive* power and traction—*front wheels pulling, rear wheels pushing*—guarantee that Marmon-Herringtons will get you there and back—*on time . . . regardless of weather or terrain—on the highway or off.*

Throughout, Marmon-Herrington *All-Wheel-Drive* Trucks are built in proportion to their great power and traction. Frames, axles, springs, transmissions—they're all built super-strong to take peak payloads—without a whimper . . . *and do it for years and years and years.*

Yes, Marmon-Herrington *All-Wheel-Drive* Trucks are built big for big jobs. For a convincing demonstration that these great trucks live up to their reputation—both the Heavy-Duty models and *All-Wheel-Drive* converted Fords—see your nearest Marmon-Herrington dealer, or write for illustrated literature.

MARMON-HERRINGTON COMPANY, INC. • INDIANAPOLIS 7, INDIANA

MARMON-HERRINGTON

ALL-WHEEL-DRIVE



YOU'RE ON TOP of the TOUGHEST JOBS WITH A **MARION**

The unquestioned performance of MARIONS is a challenge to the toughest digging—a real buy in big yardage production. MARION machines are built to stand the gaff of

endless hours of operation. They have the power to meet all digging conditions. They have the speed to clean up jobs in a hurry. They should be working for you.

WHAT IS YOUR MATERIAL HANDLING PROBLEM?



MARION

POWER SHOVEL COMPANY
MARION, OHIO, U.S.A.

Offices and Warehouses in all Principal Cities

Whe

What a FLINK SELF-FEEDING SPREADER Will Do For You...

**NO OTHER
SPREADER
HAS ALL THE**

Advantages

of the FLINK Tailgate Type Spreader

1. Enables you to get icy danger spots covered faster.
2. Speed to danger spots, start spreading without stopping truck.
3. Finish spreading—speed on to next spot without stopping truck.
4. Operated entirely by driver with clutch control in cab.
5. Spreads all granular materials up to 1", wet or dry.
6. Does Ice Control work in winter—Road work other seasons.
7. Spreads forward or backward—full or half width of street.
8. Does not limit use of truck—won't interfere with dumping.
9. Attaches to truck as a tailgate—removed in 5 minutes.
10. Self-feeding—no helper required on back of truck. Safer!
11. Saves lives, men and equipment. Saves in every way.

Model HD-4 Hydraulic Drive illustrated. Model WD-31 has rear wheel chain drive. Both models have protective fan blade covering . . . both controlled from cab.

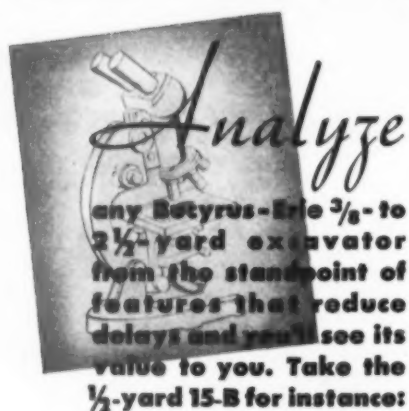
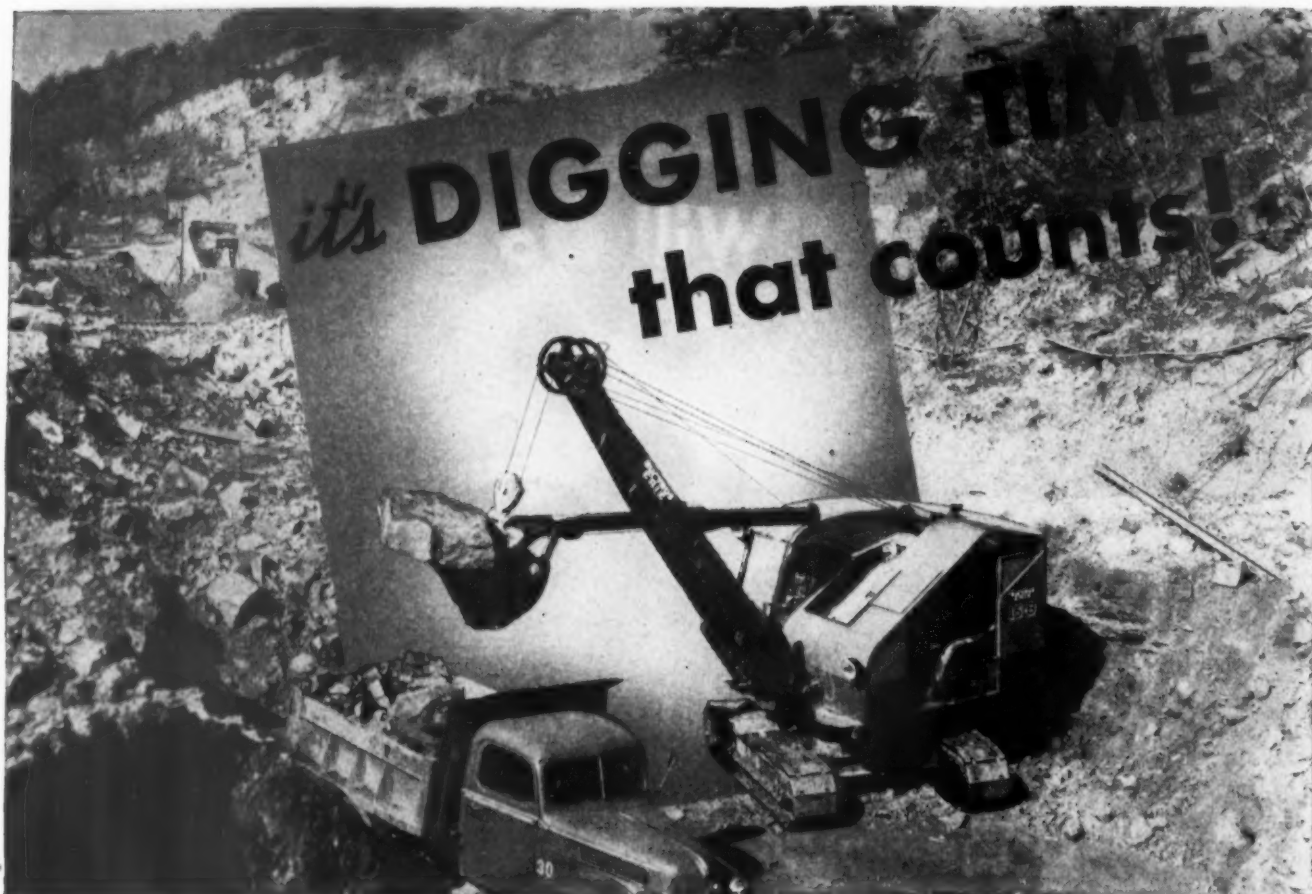
The FLINK CO.

Dept. 678, STREATOR, ILL.



FAST NON-STOP SPREADING

**WITHOUT
LIMITING
USE OF TRUCK
TO SPREADING
ALONE**



MOBILITY: The 15-B is easy to steer in sharp or gradual turns and there's plenty of power to climb grades up to 30%. Time spent in moving is cut to a minimum.

MATERIALS: Only controlled-quality materials, properly treated, are used.

WEIGHT: The lightest weight consistent with ample strength is maintained throughout so that stresses on all parts of the machine are kept at a minimum. The 15-B, like all other Bucyrus-Eries, is individually designed for its work.

PERFORMANCE: The smooth, quiet performance of the 15-B—obtained with widespread use of anti-friction bearings, oil enclosed gears and accurate alignment—means less maintenance, reduces operator fatigue, and increases digging time.

ADJUSTMENTS: All adjustments, including singlepoint adjustments on clutches and brakes are easily made and stay put for long periods.

ACCESSIBILITY: Parts are large, simple, few in number, easy to get at for replacing. Lubrication fittings are easy to reach, hard to miss.

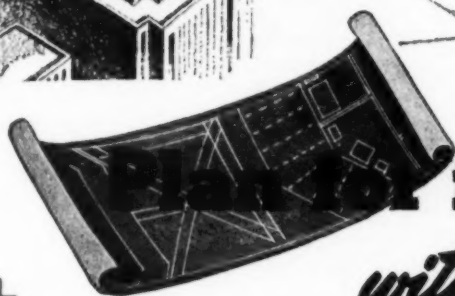
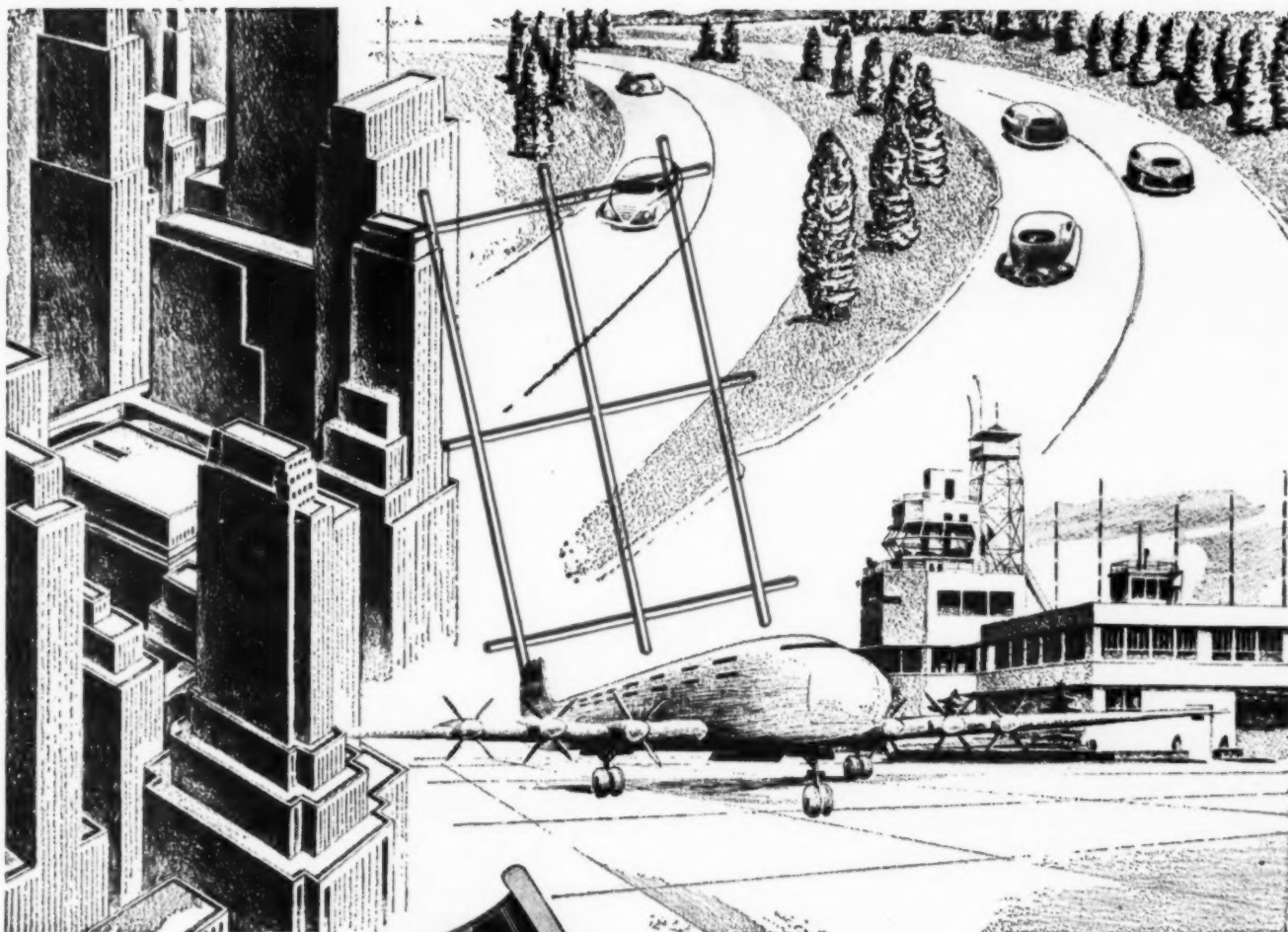
CONTROL: All operating levers, including lever for positive digging lock, are grouped at the operator's position. There are no time-wasting delays caused by the operator's having to leave his normal position.

CYCLE: All functions are balanced and synchronized so that there is no overstressing of any part or parts to cause too-frequent adjustments and excessive wear.

64E46

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most of
EVERY HOUR
with a
BUCYRUS-ERIE

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for tomorrow with this Proven Fabric



At our busiest airports, on our best paved streets and highways, in our tallest buildings, you can see how concrete construction contributes to modern living.

Welded Wire Fabric, the most vital factor in concrete construction, is invisible in the concrete slab, but imparts the strength and stamina to control cracks that may form in concrete.

American Welded Wire Fabric is the most widely used prefabricated concrete reinforcement. Its closely spaced steel wires are electrically welded into a prefabricated mat which fortifies against major stresses and strains.

Many additional uses of concrete will be made possible by the ability of this versatile reinforcement to meet new requirements. So when you are planning for tomorrow, it will pay you to know *all* of the ways you can use American Welded Wire Fabric. For wherever it is practical, it is also economical.



American Steel & Wire Company

Cleveland, Chicago and New York

*Columbia Steel Company, San Francisco,
Pacific Coast Distributors*

*Tennessee Coal, Iron & Railroad Company, Birmingham
Southern Distributors*

United States Steel Export Company, New York

UNITED STATES STEEL

Fast Work WITH THE **LINK-BELT SPEEDER** *Keeps Trucks "On the Jump!"*

Scooping two yards of sand and gravel from river bottom to truck in less than a minute, this Link-Belt Speeder sets a fast pace for the 15-ton trucks. In fact, the dragline has doubled production at the plant, and has brought about a new technique in truck handling to take full advantage of the capacity of the machine.

Maintaining 10 to 15 truck-loads per hour all day is no task for the operator, since Speed-O-Matic full hydraulic operation gives him finger-tip, effortless control of every movement of the machine. "It's the easiest handled machine I've ever seen," he says.



K-375 Link-Belt Speeder Dragline operated by
Grove Stone and Sand Co., Swannanoa, N.C.,
Averages 200 tons per hour—All day long.

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DAGLINES
LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
A DIVISION OF LINK-BELT COMPANY

Whenever the owner's requirements change, the 300 Series Machines can be quickly converted to shovel, crane, trench-hoe or pile driver. Any Link-Belt Speeder has multiple-use possibilities. Keep in the bidding, with your "many-purpose" Link-Belt Speeder!





C. I. T. FINANCES PURCHASES OF CONSTRUCTION EQUIPMENT

CONTRACTORS: You can acquire modern, labor-saving equipment without tying up your working capital. C.I.T. will finance your purchases of income-producing machinery **AT LOW COST.**

You make a reasonable initial payment; C.I.T. furnishes the funds to complete the transaction. Put your new equipment to work and let it help pay its own way out of increased earning capacity.

When you equip yourself with construction machinery, designed to perform specific work with utmost efficiency, you can handle more work per day, do a better job and earn larger profits.

C.I.T. financing is designed to conserve your working capital for pay rolls, supplies, taxes and other operating expenses. It enables you to own the proper equipment and spread the cost over extended periods of time.



Send for this booklet which explains how C.I.T. funds are obtained.

Executive Offices: ONE PARK AVENUE, NEW YORK

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AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

**FOR
LONGER ROPE LIFE—
WICKWIRE SPENCER
WIRE ROPE
—IN ALL SIZES AND
CONSTRUCTIONS
—FOR EVERY NEED.**

Constant, careful control through every step of manufacture assures dependable performance, safety and long life in Wickwire Spencer Wire Rope.

**HOW TO PROLONG
ROPE LIFE AND
LESSEN ROPE COSTS . . .**

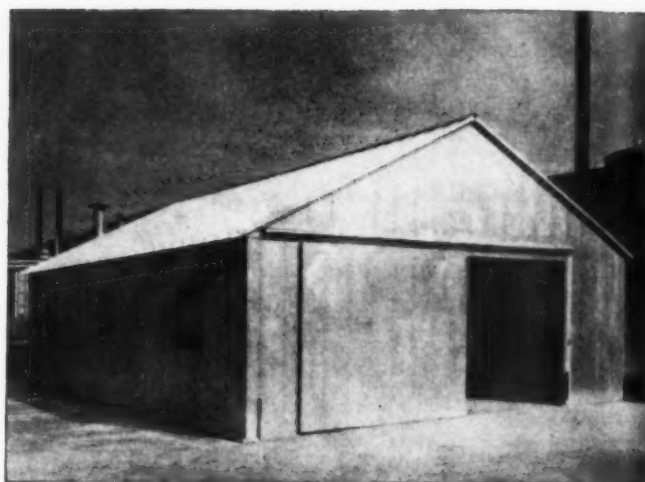
Thousands of wire rope users—old hands and new—have found "Know Your Ropes" of inestimable value in lengthening life of wire rope. Contains 78 "right and wrong" illustrations, 41 wire rope life savers, 20 diagrams, tables, graphs and charts.



*For your FREE copy, write
Wire Rope Sales Office, Palmer, Mass.*

CFI WICKWIRE SPENCER STEEL DIVISION
The Colorado Fuel and Iron Corporation
THE CALIFORNIA WIRE CLOTH CORPORATION
EASTERN GENERAL SALES OFFICE: 361 DELAWARE AVE., BUFFALO 2, N.Y. EXECUTIVE OFFICES: DENVER 2, COLORADO WEST COAST OFFICES: OAKLAND 4, CALIFORNIA

4 men CAN ASSEMBLE THIS



in 10 hours!

Quick assembly and easy portability are two important advantages of standard ARMCO STEELOX Buildings. Once the foundation is in, an inexperienced crew of four men can assemble a 12' x 24' building in 10 hours.

This is especially important for field offices, warehouses, tool houses, garages and other buildings. Because ARMCO STEELOX Buildings are "portable," they can be moved from one location to another in less than a day! STEELOX panels can be salvaged 100% and re-used many times.

BONDERIZED FOR PAINTING

Prefabricated sections of STEELOX Buildings are durable. The Bonderized Galvanized PAINTGRIP surface can be painted immediately. STEELOX Buildings can be quickly wired, easily insulated. Tight flanges help prevent penetration of dust, insects or vermin. And all-steel construction is an excellent fire-barrier.

Get prices and the complete story of ARMCO STEELOX Buildings by writing Armco Drainage & Metal Products, Inc., and Associated Companies, 1045 Curtis Street, Middletown, Ohio.



Armco

STEELOX BUILDINGS

HIS

P&H

TRUCK CRANES

**ALWAYS READY
FOR A**
quick take-off!

Yes, this new P&H Truck Crane is right at home in fast company. For it's a high speed traveler — always ready for a *quick take-off* to the next assignment — across town or across the state — wherever there's heavy work to be done.

Dual power does it. One engine geared for travel . . . another engine for load handling. Less time between jobs — more performance* on the job!

Whether it's crane, dragline, shovel, or other work, this dual power combination is a sure bet for lower handling costs. Write for full details.

P&H Added Values

- Hydraulic Control — a new peak in operating ease and safety.
- Greater stability — with exclusive torsion bar-mounted front axles and lower center of gravity.
- Independent Planetary boom hoist — raises or lowers boom smoothly, with or without load.
- Planetary load lowering — permits "inching" of loads, accurately.
- All-welded construction — greater strength. Weave-proof frame eliminates sway at boom point.

P&H REMOTE CONTROL AVAILABLE

With this unit you can control all carrier movements (even the horn) by electric push buttons — from operator's position inside the crane cab.

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS • HOISTS • WELDING ELECTRODES • MOTORS

General Offices: 4496 W. National Ave., Milwaukee 14, Wis.



▲ Above: "Size for size, no P&H Truck Crane has ever been outlifted!" Here a heavy steel girder is gently moved from flat car to trailer . . . evidence not only of the truck crane's power, but of the "inching" made possible by Planetary load lowering.

► Right: P&H Truck Cranes "take 'em as they come" — like this job, which calls for accurate placing of big batches of concrete. Tomorrow this same machine may be lifting out the forms . . . then speeding miles away to start a new excavation. (See bottom of page for the many P&H Truck Crane applications.)



SHOVEL



CLAMSHELL



CRANE



DRAGLINE



TRENCH HOE



PILE DRIVER

PERFECTION PROFIT POINTS

For all makes
and models of
trucks.



Write for literature and names of
nearest distributors.

1. Bodies are carefully made of high-resistant sheet steel, securely welded to all-steel understructure.
2. Heavily braced and reinforced at all points of greatest wear and strain.
3. The Perfection Line includes both standard and special purpose bodies for every need.
4. Chassis protected from heavy strains and loads by Perfection's balanced power thrust, double compound-type lift arms, cushion-stop drop mechanism, and the hoist's full length steel sub-frame.
5. Hoist action is smooth, powerful, and responsive. Pump and power take-off are of exclusive Perfection design and manufacture.

THE PERFECTION STEEL BODY CO.

Galion, Ohio

PERFECTION

TRUCK BODIES AND HOISTS



The Quality Line! **WELLMAN** *Williams Type* **BUCKETS**

• You get longer service with less maintenance when you use Wellman Williams buckets because this quality line pioneered the field in welded construction of high-grade rolled steel. *Wellman-built means better-built!*

SEND FOR BULLETIN

THE WELLMAN ENGINEERING CO.

7003 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in Principal Cities

There's a Standard Blackhawk Ram for Every Road Job



Power-Driven P-104

Power-Packer Pump—belt or gear driven—control valve is operated from cab. Compact, easily installed.

Hand Operated P-60

Power-Packer Pump—mounts in cab. Blackhawk is also the source for RAMS and VALVES used with these pumps.



For Faster, Safer, More Dependable Performance . . . Demand BLACKHAWK HYDRAULIC CONTROLS on ALL Your Road Equipment

YOU'RE turning the "muscle-work" over to a real toughy when you depend on Blackhawk Hydraulic Controls to actuate moving parts on your road equipment. A fingertip touch on a conveniently located lever puts these fast-acting, dependable rams to work lifting and lowering — safely and accurately. Blackhawk rams are compact and powerful — easily adapted to all road equipment. For "easy going"

on roads, specify Blackhawk Hydraulic Controls on all your equipment. For complete information on the advantages of Blackhawk Hydraulics write your equipment manufacturer.

TO EQUIPMENT MANUFACTURERS

Blackhawk Hydraulic Controls are engineered and priced for quantity purchases and practical installation on the products of other manufacturers. Submit your hydraulic problems to us. We will work with you in confidence.

A Product of BLACKHAWK MFG. CO., Dept. R5, Milwaukee 1, Wisconsin

BLACKHAWK

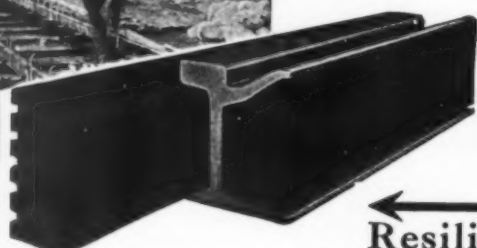


CITY STREETS REQUIRE PAVEMENTS TO BE IN SOLID CONTACT WITH RAILS.

Servicised

PREMOLDED RAIL FILLER FOR TRACK INSULATION

MUFFLES NOISE BY
DIMINISHING VIBRATIONS!



← Holds Rails Solid, But in
Resilient Contact With Pavement.

Servicised—Bituminous Resilient Rail Filler Cuts Down Maintenance Costs for Both City and Railway Company by Eliminating Expansion & Contraction Damages.

NATURE OF OUR RAIL FILLER

Through many long years of successful service our resilient Rail Filler has more than proved its inherent value to both city and Ry. company. Waterproofing spaces between rails and pavement have prevented infiltration, freezing, cracking and costly deterioration; also eliminating problems of vibration, noise, contraction, expansion and costly re-alignments. Street Railway Systems are possibly the largest users of Servicised Rail Filler, but it is also frequently used where interstate or interurban railroads run in contact with city pavements for distances of a few blocks to several miles.



SERVICISED PRODUCTS CORP.

6051 WEST 65TH STREET

CHICAGO 38, ILL.

You get a real lift with a **HANSON** Crane

Low center of gravity; full revolving; air controlled steering; extra long crawlers; all clutches easily adjusted and relined without dismantling shaft assemblies; heavy duty industrial type gasoline or diesel motor; and other outstanding features!

Write for Catalog RS-96.



Rated at $4\frac{1}{2}$ ton lift (the larger size is rated at $6\frac{1}{2}$ ton) this rugged smaller brother in the Hanson family can juggle its rated tonnage with effortless ease and have hoisting power to spare!

It is quickly convertible to Shovel $\frac{3}{8}$ yd. and $\frac{1}{2}$ yd.) Dragline, Clamshell or Trench-hoe. Above the illustration are listed a few of the features which, built into this smooth-working trouble-free, profit-making unit, have helped make it popular around the world:

Other HANSON products: Yard & Dock Cranes -- Truck Shovels -- Heavy Duty Machinery Trailers.

HANSON

CLUTCH AND MACHINERY
COMPANY - TIFFIN, OHIO



Elimination of sliding contacts by means of gear teeth that roll (1) is one means of reducing friction in Gemmer Steering Gears. Another is (2) the liberal use of antifriction bearings. They are placed everywhere they are needed to cut friction—provide smooth, easy, efficient transfer of power.

Supporting these basic design qualities are many other points of superiority:

1573

Compact—Sturdy—Close coupled design provides exceptional compactness—ease of installation—saving of weight without sacrifice of overall capacity or steering arm angularity. Alloy steel forgings provide abundant strength, durability—ample safety factor—internal stresses are low.

Gemmer Steering provides ease and comfort in steering in commercial vehicles, as well as passenger.

STEER THE GEMMER WAY

GEMMER MANUFACTURING CO.

6400 MT. ELLIOTT
DETROIT 11, MICH.

How *Snow Loaders* Work While the City Sleeps

• Frequently, residents of a city equipped with Barber-Greene Snow Loaders wake up in the morning to find that there has been a heavy snowfall during the night, but they drive downtown through cleared streets. During the night, crews and equipment have followed a plan of action as well organized as a military offensive.

Barber-Greene Snow Loaders and a fleet of snow trucks, with high side boards added, maneuver through the dark streets devoid of traffic and parked cars. The main thoroughfares are clear for the morning rush and passage of emergency equipment, such as fire engines and ambulances. The snow is removed before it has a chance to compact into ice.

Barber-Greene Snow Loaders have lights as standard equipment and their 20 cubic-yard-a-minute capacity keeps a steady flow of trucks traveling to the dumping point. Write for Catalog No. 538, illustrating and describing Barber-Greene Snow Loaders. Barber-Greene Company, Aurora, Illinois.



CONSTANT FLOW EQUIPMENT



LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

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When

**KEEP YOUR HIGHWAY
SAFETY RECORD CLEAN**

FLASHES TO BOTH FRONT AND REAR

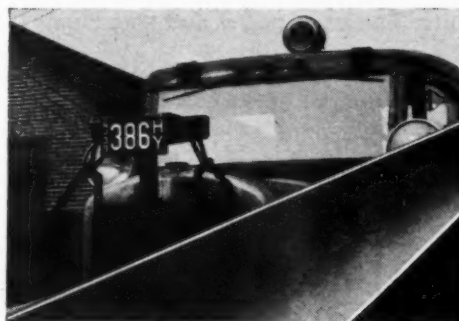
STOP

**GIVE YOUR MEN — THE PUBLIC — AND YOUR
VEHICLES THE PROTECTION THIS FLASHING WARNING LIGHT AFFORDS**

Without special warning lights, snow plows, work trucks, patrol cars, etc. that operate either at very slow or high speeds — park on highways — become highway hazards.

To overcome this — to protect your men, the public and your vehicles — install Keystone Safety Lights. They flash 80 storm piercing "STOP" warnings per minute — both to front and rear. Can be seen in weather that blots out other lights. They act as a "lighthouse" to promote highway safety.

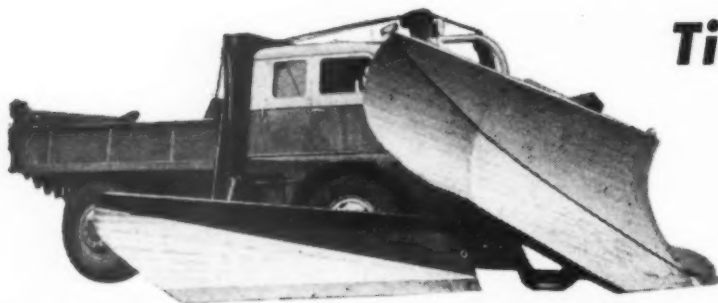
Used by highway departments of Pennsylvania, Maine, Connecticut, Illinois, to name a few; and by countless cities, counties, towns, park and bridge commissions, public utilities, etc. Request us to send you a light for two-weeks inspection, write on your official stationery. Immediate deliveries! Auto Gear & Parts Co., 16th St. & Hunting Park Ave., Philadelphia 40, Pa.



This vibration and weatherproof light is supplied with 6½" red lenses, lettered "STOP"; or with plain red, amber or blue lenses, for 6 or 12 volt systems.

*The "Lighthouse of the
Highway"*

**KEYSTONE
SAFETY
LIGHT**



Time to get ready for
WINTER!



WALTER SNOW FIGHTERS

WHAT YOU PUT OFF today, plagues you tomorrow. Experienced highway maintenance men know this . . . and are planning their snow clearing program, now. Routes are being reviewed, equipment checked, plows made ready. And the need for additional snow removal equipment is getting careful study.

Many of the largest, most modern highway departments choose Walter Snow Fighters because they are the fastest, most versatile snow clearing units. The great power and traction of the Walter

Four Point Positive Drive enables them to perform outstanding feats of snow clearance. For example, a 250 h.p. Walter Snow Fighter clears a two lane highway in one round trip—throws snow far to the side—makes widening out easier—clears main highways faster, gains extra time for opening more miles of secondary roads. Write today for complete information.

See your Walter distributor now. He is glad to supply genuine Walter parts and render expert, factory-trained service.

CONTRACTORS! ROAD-BUILDERS! **Haul Bigger Loads with WALTER TRACTOR TRUCKS**

● Walter Tractor Trucks are designed and built especially for off-the-road hauling. Unlike con-

ventional trucks, they do not bog down in mud and slippery going—because they have the power and 100% traction of the Walter Four Point Positive Drive. Three automatic locking differentials proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant. Thus, power is never wasted on slipping, spinning wheels but is always fed to the wheels that have traction. Write for literature.



WALTER MOTOR TRUCK COMPANY
1001-19 Irving Ave., Ridgewood 27, Queens, L.I., N.Y.



A Chrysler Ind. 8 engine furnishes economical and rugged power for this speedy hard-working machine.

Enhancing the Value of Powered Industrial Equipment

More and more industrial equipment manufacturers are turning to Chrysler for power.

They know that Chrysler Industrial Engine designers and engineers will cooperate in determining the most efficient and economical installation.

They know, too, that the high compression, flexible horsepower characteristics of Chrysler Industrial Engines will provide a compact and low weight power unit.

Chrysler Industrial Engines are "Pedigreed" horsepower—proved through thousands of hours' operation out in the field where class tells. They enhance the value of any type of industrial powered equipment in which they are installed.

Write the Chrysler Industrial Engine Division, or mail the coupon for the Industrial Engine catalog.

Some Applications of Chrysler Industrial Power

Arc Welders	Industrial Lift Trucks
Air Compressors	Industrial Pumps
Booster Pumps	Industrial Tractors
Concrete Mixers	Mechanical Shovels
Cranes	Motor Coaches
Crane Carriers	Portable Sawmills
Crane Loaders	Portable Well Drillers
Farm Tractors	Road Rollers
Fire Pumps	Self-propelled Farm Combines
Fuel Oil Pumps	Soil Pulverizers
Gang Mowers	Street Flushers
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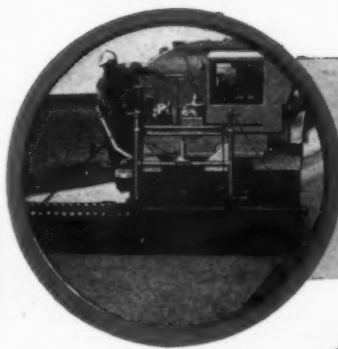
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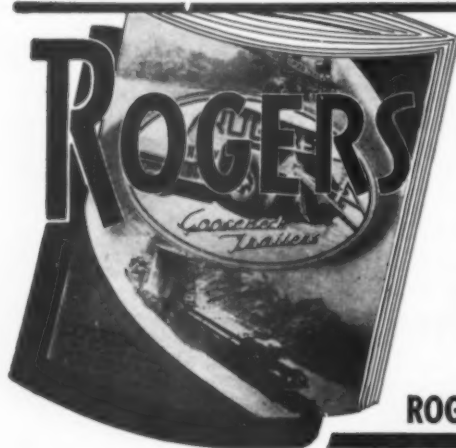
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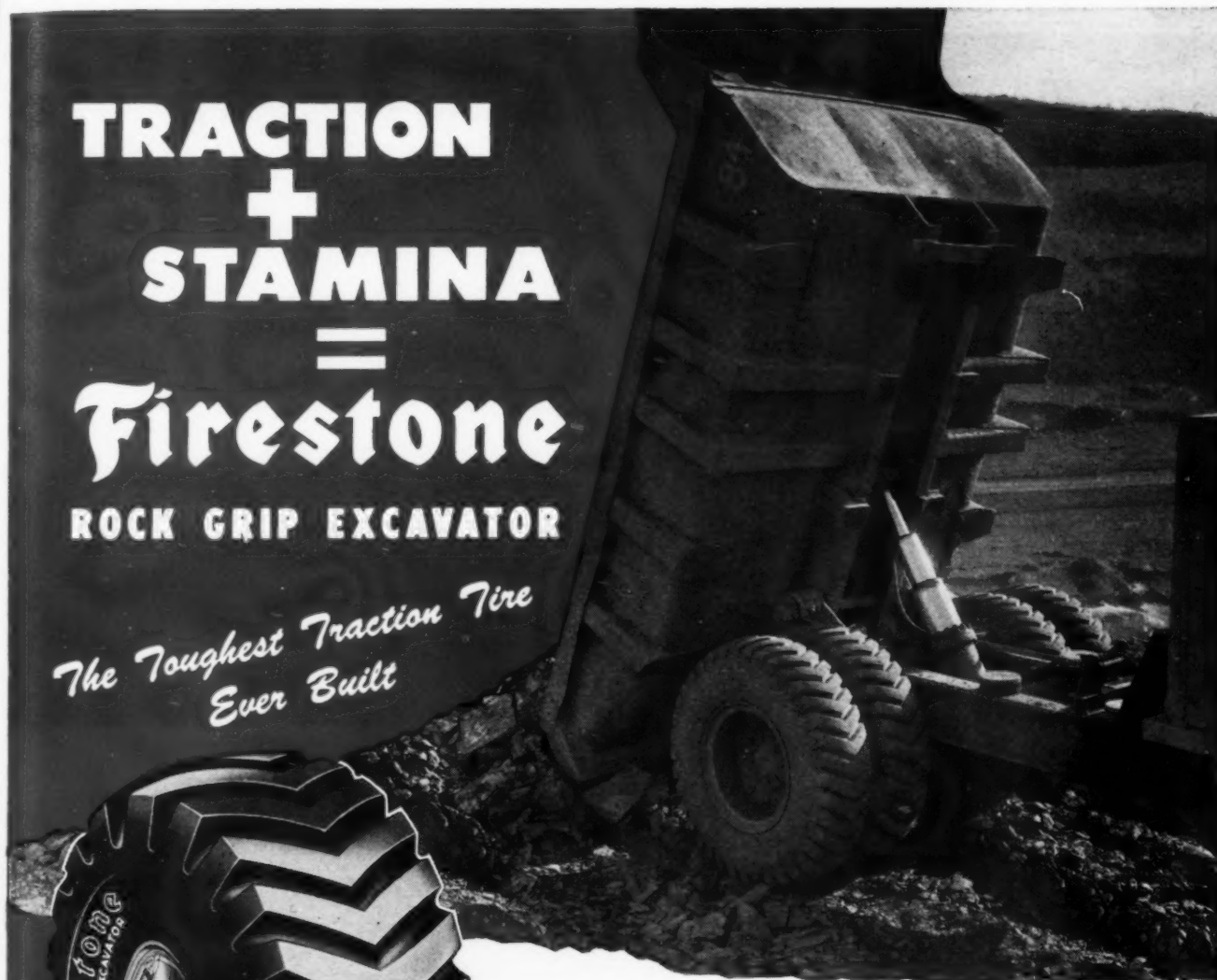
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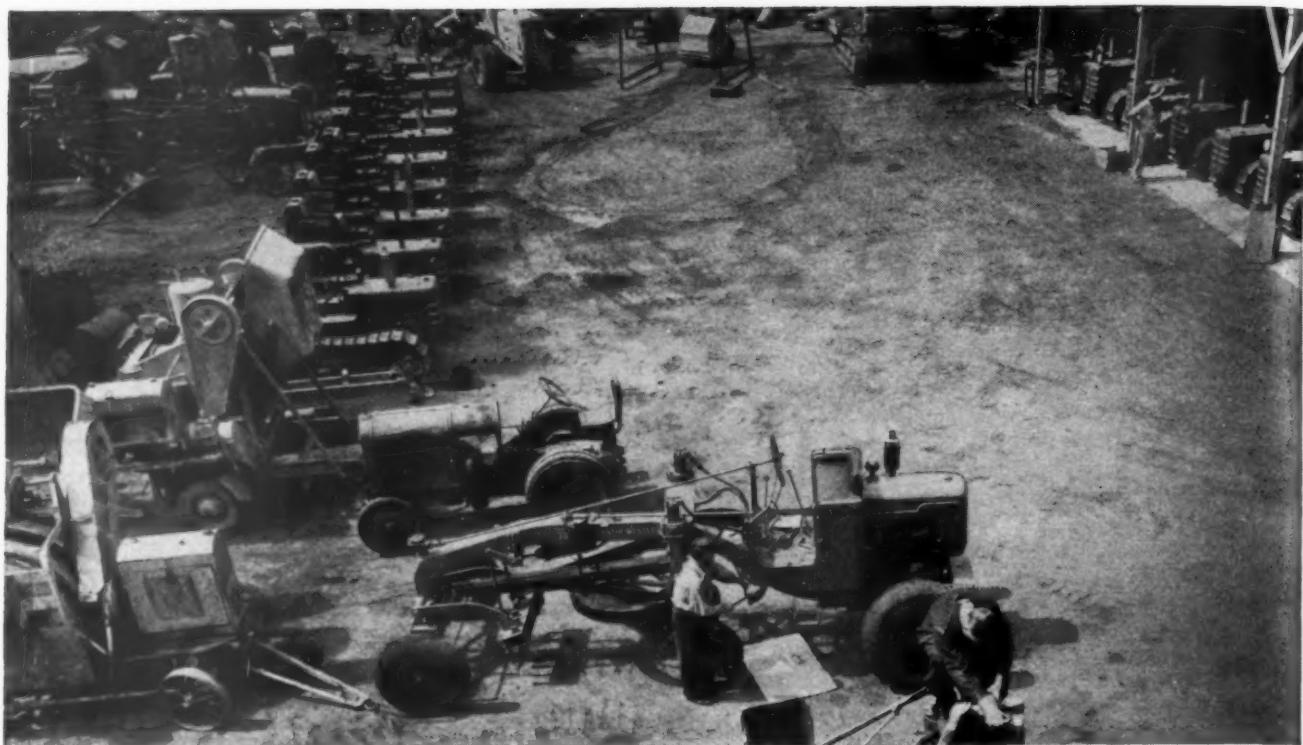
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A Pennsylvania County Commissioner writes: "We have been using your Rustproof Compound for the last two years to protect our bridges in this County. Up to this writing we have coated some seven or eight bridges with splendid results. In the near future we intend to coat more of the bridges here."



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TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

Half-mile long bridge in California has Hollow Pier Shafts

Skillful form design and re-use saved scarce lumber for firm of J. H. Pomeroy, Inc., which held \$1,900,000 contract

HOW to beat the lumber and carpenter shortage was the chief problem of J. H. Pomeroy & Co., Inc., contractors on the 24-panel high-level bridge over the Feather River at Marysville, California. Over 6100 cu. yd. of pier and abutment concrete, requiring special forming of warped surfaces and use of a half-million board feet of lumber, was involved. Further challenging the daring of bidders, the bridge spans required the fabri-

cation of variable depth girders with lengths up to 207'4" between expansion points.

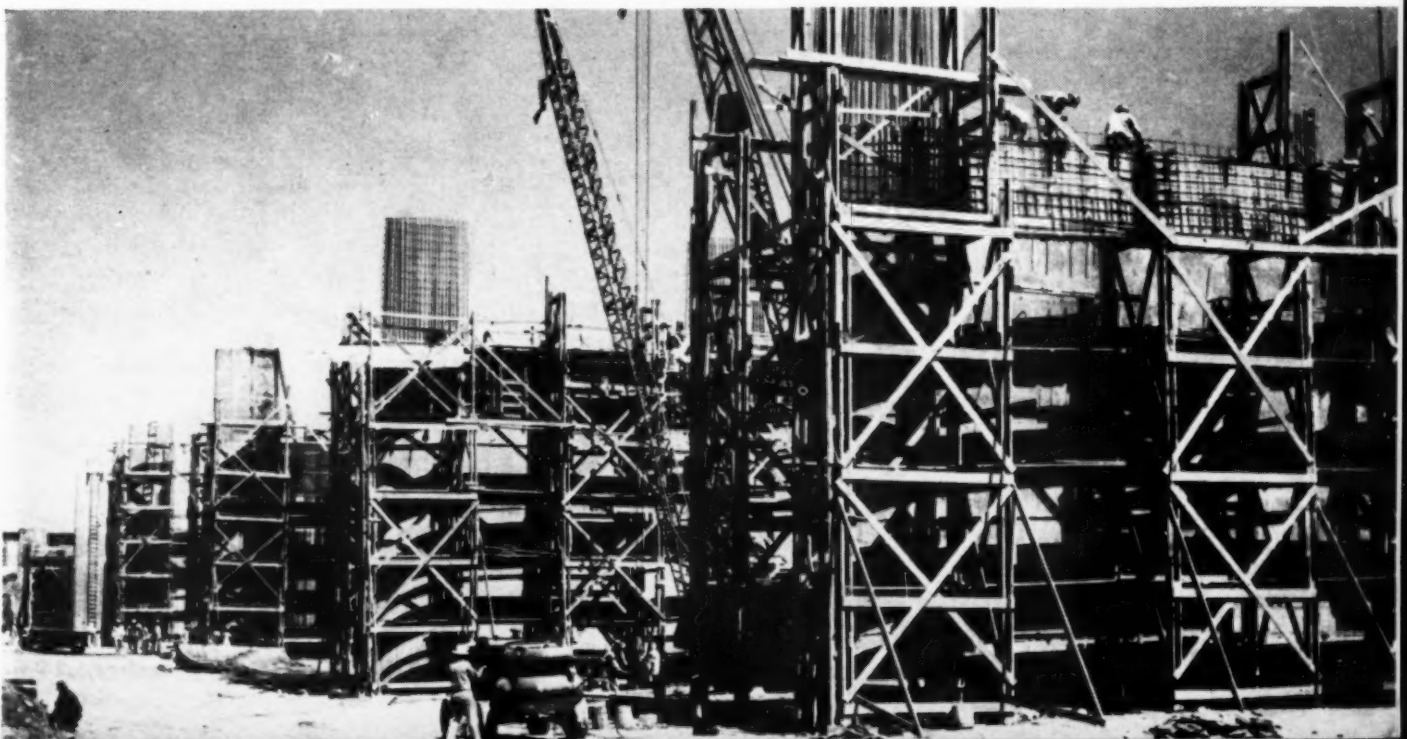
The bridge is part of a relocation of U.S. 99E through Marysville and is to replace an old narrow structure connecting Marysville and Yuba City on the opposite bank. Floods at this point rise 45 ft. above low water, necessitating high levees, and the magnitude of a bridge project over this navigable stream is seen in the fact that

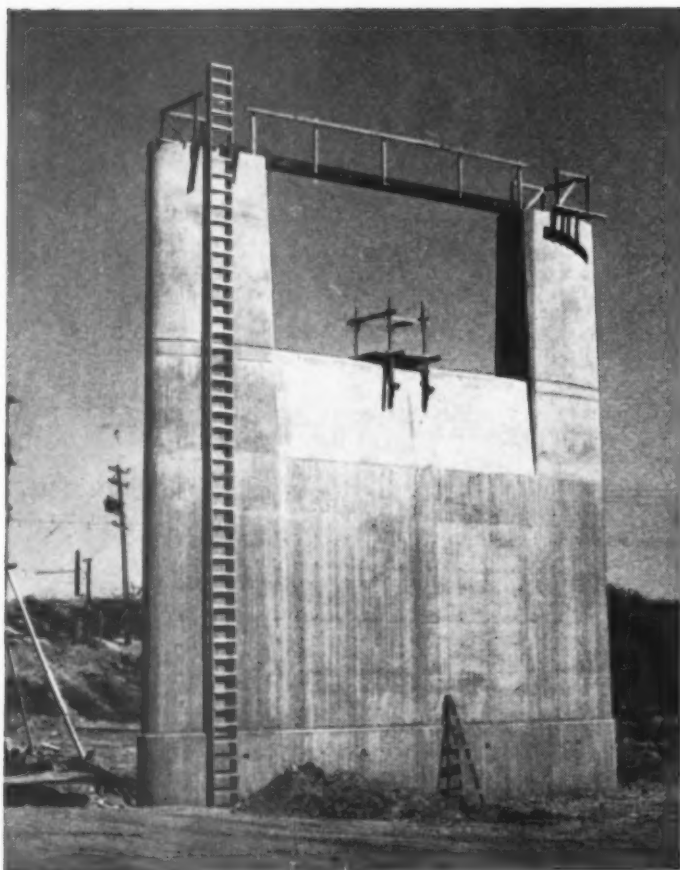
twenty-three piers ranging in shaft height from 28 to 62 ft. were required to span the wide flood channel and meet U. S. Engineer clearance requirements.

Alternate Suspended Spans

As shown in Fig. 1, the bridge consists of three channel spans of 137'-10 $\frac{3}{4}$ ", 160'-11 $\frac{1}{4}$ ", and 138'-0 $\frac{3}{8}$ ", respectively, flanked by a single side span on one end and by seventeen spans at 114'-11 $\frac{1}{4}$ " and

★ Five-pier group in process of third or fourth concrete lift. Falsework towers were designed in bolted sections. Inner forms in place and steel setters at work on the fourth lift, pier nearest





On Opposite Page

★ Fig. 1. (Upper): General profile of the bridge, showing span lengths and also the expansion joint scheme for deck girders

★ Fig. 2. (Lower): Details of the hollow concrete pier design

★ (Lower left): Pressed wood fibre form linings were given the usual form oil treatment and re-used 7 or 8 times on form panels which received an average of 9½ usages

★ (Lower right): Ready-mix trucks delivered to the big drop buckets from a portable platform

The bridge provides two 25-ft. roadways with a 4-ft. median strip and 5-ft. sidewalks on either side. The concrete deck follows standard practice.

Piers No. 5 to 12 incl. are on spread footings; all other piers and both abutments are supported on 10-in. H-piles of 42-lb. section. The contractor was aided by exceptionally low water through the spring and summer. Rectangular cofferdams using steel sheeting were employed to beat the Sept. 15 deadline set by the U. S. Engineers and work was pushed on both banks with a skid-mounted and a crawler-crane operated pile driver.

The contractors took a chance going into the river in March to start on the spread footings and piers. The Feather River floods three or four times a year between January and May, and

★ Pier No. 5, completed except for touching up. Cat walk, work platforms and ladder for finishing bridge seats, other horizontal surfaces. Rubbing of wall surfaces not required or needed

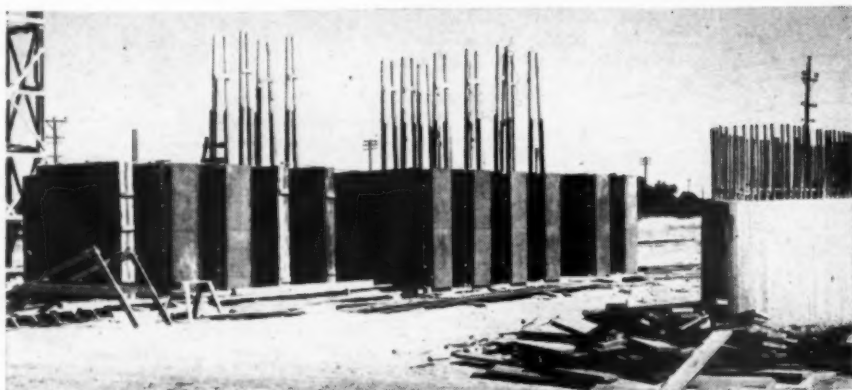


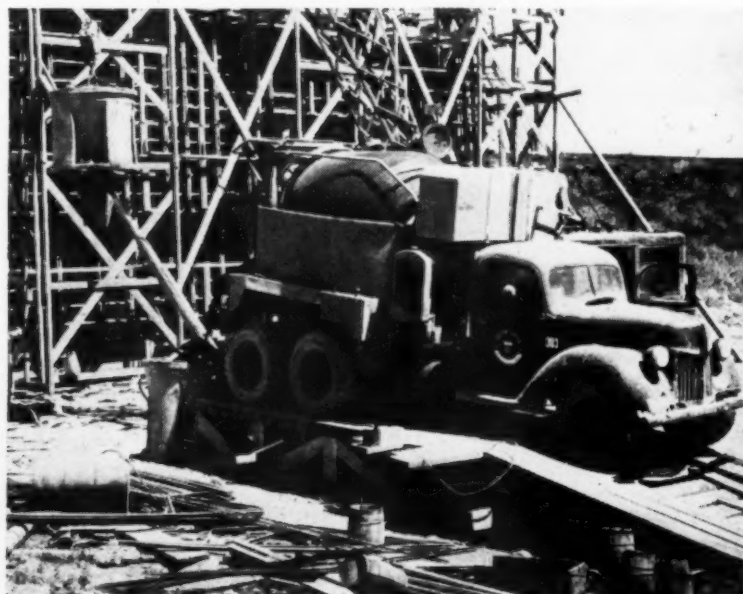
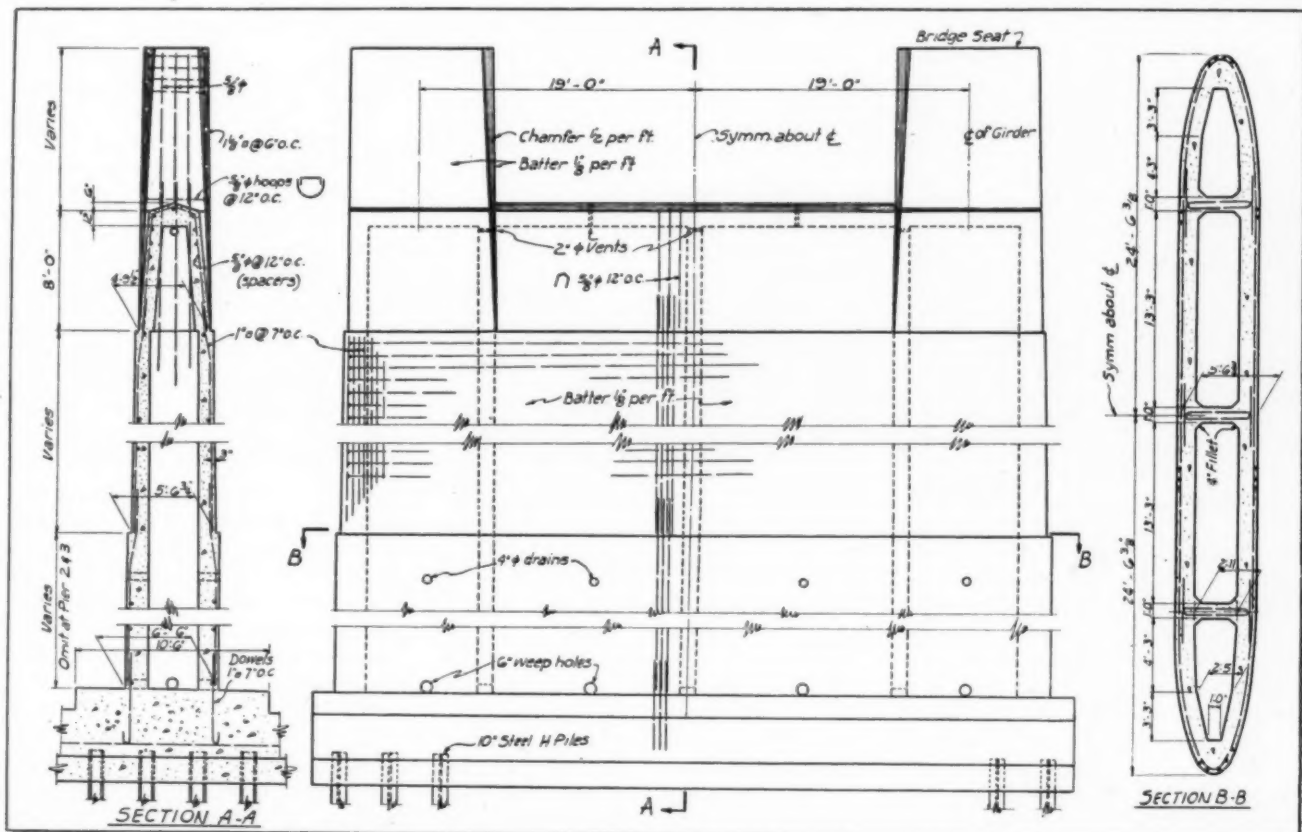
★ Well, well! A Jeep, of all things. The California division of highways, failing to get new automobiles for its field engineers, bought a fleet of these hard riding critters

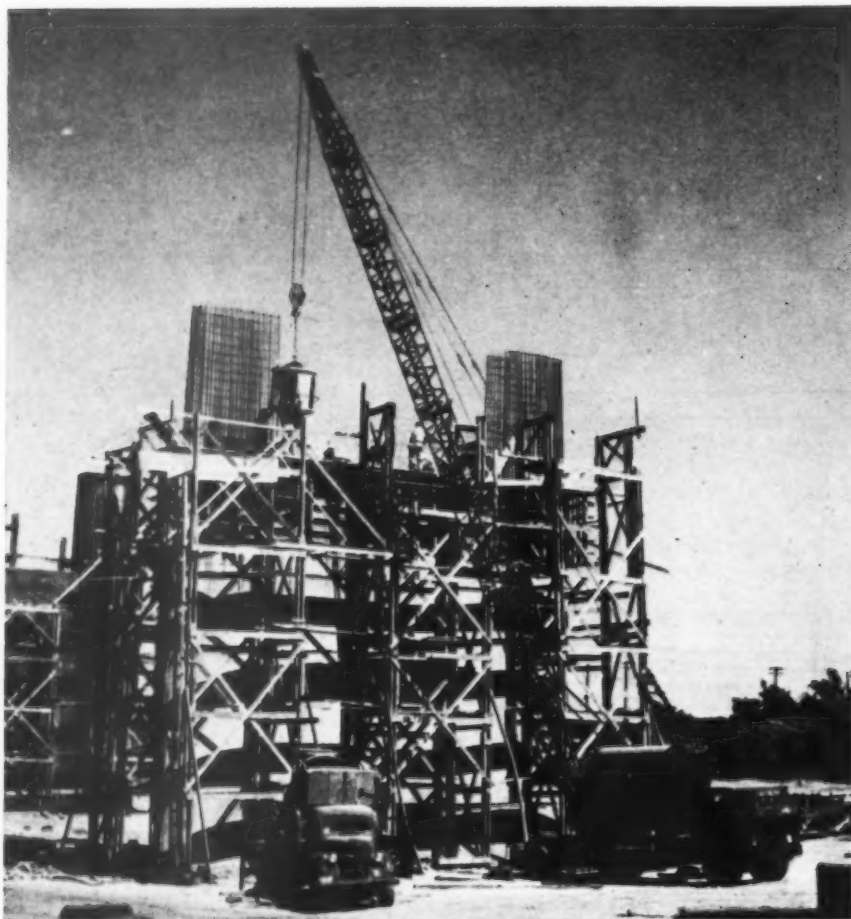
three shorter spans on the other side.

Steel girders follow the latest design practice for structures where continuity is not feasible, in that alternate cantilevered and suspended spans are provided. This arrangement has the advantage of keeping bending moments to a minimum and of eliminating expansion details at piers, expansion being taken care of by hinged construction at girder suspension points.

★ (Upper): Inner forms in place, steel set, and outer form quadrant being lowered to position for the first pier lift. (Lower): Inside form panels for the hollow construction. Note lifting posts







they were very fortunate in this respect, as they did not meet any high water after January 15 and a great deal of work was accomplished during this period, well ahead of schedule. The bridge is due to be completed May 2, 1947; but it is believed that if the steel, scheduled for delivery starting September 10 and finishing December 1, arrived as scheduled, the job should be completed four months ahead of schedule.

Pier Forms Big Task

The big job here was the forming and concreting of piers. Fig. 2 shows the curved hollow design employed, excellent from the standpoint of structural economy and efficiency, but requiring some nice form panel design and fabrication by the contractor. Note that the streamlined piers were, however, designed with forethought to form simplification. Pier shafts are

★ Concreting of the last two lifts required an 85-ft. boom on most of the piers

given three set-back lines, at points which lend pleasing architectural appearance and also comprise convenient lift levels in forming. Inner and outer forms for the pier walls were each designed in four sections for each lift. In order to conserve lumber and make most efficient use of the three crawler cranes on the job, the contractor decided to make up five sets of form panels for the first lift, five for the second lift, four sets for the third lift (uniformly 8 ft. for all piers), and three sets for the top lift up to the bridge seats.

An average of $9\frac{1}{2}$ usages was made of each set of forms. They were designed with somewhat heavier studs and waling than usual for this reason. Cone and rod bracing was employed, and "she-bolt" connections for quarter panels.

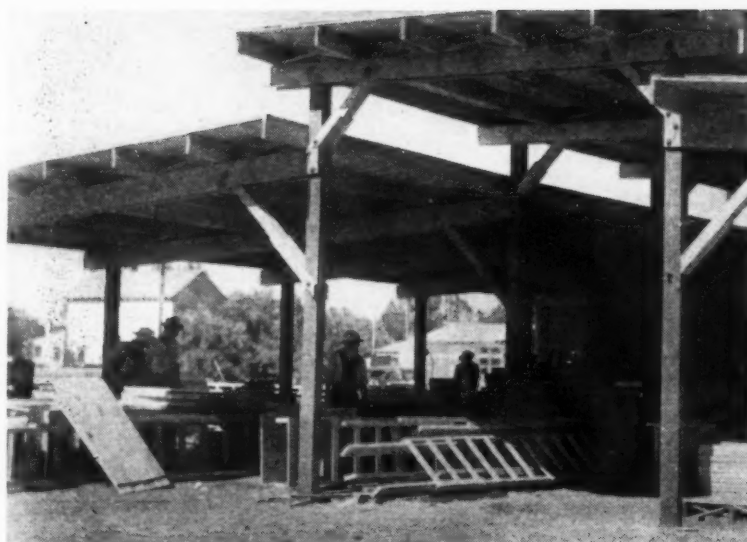
A typical crew on each pier operation consisted of 13 formsetters, steel setters and helpers. The footings required an average of 5 days for each pier, the first lift 8 days, the second lift 9 days. Five piers were in progress at a time up to this point, after which the men went back and topped off two piers at a time with the remaining lifts and moved scaffolding ahead. This time schedule included form removal and re-setting, steel setting, and concreting, but not curing and cleaning up.

When forms were moved ahead to the next set of five piers the moving job was done by loading them onto a big "hay rack" or wagon which was towed by a tractor. Form panels were handled by



★ (Left): General view of the form fabricating yard with shop and storage building in right background. (Right): Electrically driven booster pump (lower right of scene), surge tank and automatic electric control boxes — set up by contractor to provide 60 lb. pressure for spray-curing the high piers





★ Form panel fabrication was sheltered, open "California" style under roof as shown. Note the heavy-duty electric table saw



Access Highways to Help Lumber Shortage

Construction is planned to start at once on access roads to standing timber in national forests and Indian reservations as a means of providing lumber for housing. According to an ARBA bulletin, the program includes 213 projects in thirty-one states and will provide 1,417.6 miles of new roads and improvements on 490.6 miles of existing roads in national forests, and eight projects providing 222 miles in Indian reservations. Among states in the lead are Montana with 249.4 miles, Idaho with 240.5 miles, California 107 miles, Colorado 103.7 miles and Washington 102 miles.

Funds for the roads are allotted out of the \$815 million made available for this purpose under Section C of the Veterans' Emergency Housing Act of 1946, which supplements funds in the regular appropriation to the Forest Service. Estimates place the new lumber cut in 1946 at 173,000,000 board feet, 952,000,000 feet in 1947 and 1,173,000,000 feet in 1948. This is from national forests; Indian lands would provide an additional 87 million board feet this year.

These access roads will be of the heavy-duty type to stand the wear and tear of year-round hauling by logging trucks. Construction will be carried on by the Forest Service, the PRA, by contract and by force account.

In connection with this program of access roads to lumber districts, the highway department of California in collaboration with PRA is building a 35-mile stretch on the Trinity highway in Northern California, to cost \$350,000 jointly met by NHA and the California highway departments.

cranes having booms up to 85 ft. in length. Five cranes on the job also placed concrete, using 1-yd. drop buckets supplied by ready-mix trucks and performed other tasks including excavation and pile driving.

Special Form Liners

A feature of special interest was the use of 10,000 sq. ft. of pressed wood fibre (Masonite) for form lining as a successful and economical substitute for the usual plywood, which was unobtainable. Form lining was re-used as high as eight times before becoming rough, pitted or otherwise ready for replacement. Forms were oiled with a spray pressure outfit in the customary manner using ordinary form oil.

Form panels were manufactured in an extensive wood-working shop set up at one end of the bridge. A single heavy-duty power table saw handled the volume of cutting necessary.

As high as 34 carpenters were employed on the project, most of them drawing pile-butt wages (1.95). Over the Decoration day week-end they drew double time, and you wonder why contractors bid high these days. Most lumber was purchased green, and a systematic part of the routine was to stack all lumber so that it would cure quickly.

Thorough curing was insured by hose sprinkling of all exposed pier surfaces beginning at once as forms were stripped, and by setting up a spray bar late in the day for keeping surfaces wet for several

days. The city water supply provided insufficient pressure for this job, due to the high elevation of pier tops, so the contractor installed a booster pump with automatic electric cut-out set at 60 lb. pressure.

Piers Not Rubbed

The usual hand or power rubbing of pier surfaces was dispensed with except where objectionable flaws required such attention in the opinion of the engineer. The first four feet of surface above the footings were formed with rough lumber to create a pattern of form marks.

As noted in Fig. 2, hollow piers were designed to have side walls varying in thickness from 12 in. to 21½ in. Reinforcing consisted of 1½ in. or 1 in. square bars on 7-in. centers. The rather thin wall section, bristling with steel, necessitated special care in concrete placement. Four internal vibrators were employed on each pier lift and such details as spading and careful spotting of the bucket were rigidly watched.

Deck steel is being set from the ground for all except the river spans, using two heavy-duty high-boom cranes. Two other heavy cranes are used in the yard for sorting and loading out. The girders range from 11 to 53 tons each.

The bridge was designed by the bridge department of the California division of highways, G. T. McCoy, state highway engineer, and F. W. Panhorst, bridge engineer. Harry Carter is resident engineer and Ogden Odman superintendent for J. H. Pomeroy & Co., the contractor.



★ This 170-ton electrically-operated 5 cu. yd. shovel was one of four Brewster had on the Wilkes-Barre Scranton Airport

Moving a 170-Ton Shovel

from a Mountaintop Airport



Geo. M. Brewster & Son Co., Inc., used specialized equipment to bring their big shovel down

WHEN your reporter first watched four 5-cu. yd. electric shovels working on the Wilkes-Barre Scranton airport there were too many interesting things to see about them to wonder how they ever reached the airport site. It

wasn't until some time later, when the grading was completed, that we had the good fortune to again visit the job and have a chance to watch Brewster's mechanics dismantle and load one of these 170-ton giants.

★ (Above): Big wrenches, heavy jacks, and an air compressor are carried on a special tool truck. (Below): Boom being loaded on standard trailer. This 35-ton truck carried the dipper and numerous smaller items in a compact load. Crane in the background proved indispensable in dismantling as well as loading operations



Proper Equipment Essential

It didn't take very long to tear one of them down and load the parts onto a couple of trailers and one large truck. Odds and ends went on the one or two bottom-dump trucks which were going with the shovel anyhow. As we watched the operation it became clearer all the time that the secret of the seemingly simple procedure lay in having the right kind of equipment for the job. Everything about the big shovel is heavy, so the first piece of equipment to show up was a crane big enough to easily handle any of the parts. Along with the crane came a specially equipped truck bearing big wrenches, powerful jacks, an air compressor and an assortment of tools. As the mechanics loosened the cab, dipper, boom and accessories, the crane would take the strain until each piece was completely free and then set it down a convenient distance away. Soon every part was reduced to a convenient handling size and the trucks and trailers moved in.

Loading the 12-ton dipper on a 35-ton truck and the boom on a heavy duty trailer looked like child's play. It soon developed that even this operation had been carefully planned so that when the truck and trailer were loaded there was no waste space and most of the small pieces were packed around the heavy items in a neat load. Nothing was left to chance. Every piece was carefully fastened and the drivers did not hesitate to question the manner in which any of the hold-down chains were arranged. Tightening hitches were tried again and again. Oil barrels, electric cable and odds and ends



★ Underslung trailer backs into place so that frame may slide under shovel chassis when back wheels are removed. Chassis has been stripped of most removable parts such as cab, boom and dipper

made up the dump truck loads. The only thing left was the heart of the machine, the frame and tracks to which all of the other parts fasten.

Underslung Trailer Saves Lifting

There may be some other way of doing the same job, but nothing else could be as practical as the underslung 100-ton-capacity trailer which backed up to this concentrated tonnage and walked off with it in a matter of about four hours in spite of an hour of heavy rain.

The accompanying pictures show how the trailer and crane working together, occasionally assisted by a bulldozer or the special tool truck or the special welding truck, left almost none of the work to the mechanic's brawn. We only saw one man lift a heavy load, and he didn't need to do that.

The versatility of modern equipment showed up in several instances during the loading. At one stage the gear housing under the base threatened to hold things up because it lacked a couple of inches of clearing the inside of the trailer frame. A welder showed up with a truck fitted with both acetylene and electric welding equipment. In a matter of minutes the trailer frame had been carefully notched in



★ Crane picks up easy-to-remove back wheels of trailer and places them in position behind chassis where they will be replaced when chassis is loaded on frame

a way which actually helped to insure against the load shifting.

Compact hydraulic jacks with huge lifting capacities were fitted into close quarters to lift the shovel base high enough so that the trailer wheels could be put on

★ (Left): Trailer frame is notched when it proved to be too narrow to straddle gear housing. (Right): Special welding truck carries both acetylene and electric welding equipment. Welder is readying cutting tools





★ Trailer frame is in place with two hydraulic jacks shown ready to raise the frame and chassis high enough so that wheels can be replaced. Note axle bearings shown on top of frame and the sled runner shape of frame designed to facilitate backing it under loads



★ Jacks have raised load high enough so that bulldozer can pull the treads out. Cat side frames are then removed and rear wheels of trailer replaced. A hard rain occurred at this point



★ The truck starts off across the now muddy airport with its heavy load



again. When the jacks had the base off the ground a couple of inches a bulldozer snaked the tracks out from under it. Then off came the cat side frames and soon the trailer wheels were back in place. After a careful check of the load and the manner in which it was held down, the trailer crew loaded up their tools and nonchalantly drove away.

Each Load Itemized

As the various operations proceeded we noticed one man as being ever present and always carrying a clip board with a bunch of papers on it. When we questioned him as to his part we learned that Brewster doesn't leave anything to chance. Every separate part of this big machine and its accessories are listed and a load table is made up for each truck and trailer. When the time comes to reassemble the machine there can be no argument as to where this or that part was put.

The mechanics say they unloaded and assembled the machine on the airport in 4½ days and now that they have had some practice they expect to put it together much faster at the new location. They probably will, as we understand that it is not in nearly as many pieces now as it was when it was delivered new from the factory.

All in all it gave us a new respect for that old saying, "A person can get used to anything."

★ Height of load is checked for bridge clearance. Trailer frame has been pushed under chassis and is being very carefully lined up to insure even load balance. Note tool truck



★ Secret of smooth-riding retreatment is a specialized spreading machine developed by S. Carolina engineers. This machine includes two standard mixing and levelling machines, to which is attached a novel strike-off board to give aggregates a final mixing and spread them to desired cross-section. Exceptionally long wheel base corrects all longitudinal irregularities

Notes on South Carolina's

Retreatment Methods

"One of the best states for good looking, smooth riding bituminous roads," is the comment of Mr. Glidden in passing this outline along to us. This is the first year retreatment has been let to contract — an important forward step. Program includes widening, patching and resurfacing. Interested bidding has kept prices usually between 18 and 24 cents per sq. yd.—EDITOR

By H. K. Glidden

Eastern Editor, Roads and Streets

WITH men, equipment and materials again available, the State of South Carolina is carrying on an extensive retreatment program designed to again place the state's road system in first class condition. A typical project is in progress on Highway No. 215 between Jenkinsville and Carlisle. The MacDougald Construction Company of Atlanta has the contract at a price of 23.6c to cover materials and manipulation required for a 65 lb. per sq. yd. resurfacing.

Retreat 3 to 5 Miles Per Day

Using his own equipment, sup-

plemented by a finishing machine which is rented from the state, the contractor is able to retreat from 3 to 5 miles of 20-ft. pavement per day. The retreatment process employed is the same one South Carolina has used for the past 10 or 12 years. During this time manipulation practices have been improved somewhat. The surface resulting from this treatment is of good texture, non-skid, and highly resistant to traffic wear.

In maintaining its highways, the state has found it necessary to retreat a road on an average of every 6 to 8 years. Prior to the placement of the retreatment material, the existing road is carefully

patched wherever failures or rough spots have occurred.

Four Classes of Treatment

The grading of the coarse aggregate used must conform to the following requirements:

Aggregate No. 9

% Passing Sieves having Square Openings	Minimum	Maximum
1/2 in.	100	—
3/8 in.	80	100
No. 4	20	50
No. 16	0	6
No. 100	0	2

Fine aggregate must be graded in accordance with the following requirements:

Aggregate No. 12

% Passing Sieves having Square Openings	Minimum	Maximum
3/8 in.	100	—
No. 4	90	100
No. 16	50	86
No. 50	2	20
No. 100	0	5
Clay by Elutriation	0	3

The specifications call for a high grade RC-1, RC-2 or RC-3 cut-back



★ Operators and laborers ride the special spreading machine to insure uniform grade and line. Minor depressions are filled and hand raked



★ The special spreading machine carries enough surplus material to easily take care of depressions. Width of pavement can be varied by increasing or reducing the number of sections in the strike-off board

asphalt having a penetration range of from 80 to 100.

Prior to the placement of any of the surfacing material, a uniform tack coat of cut-back asphalt is applied at the rate of .10 to .15 gal. per sq. yd. This quantity of cut-back asphalt is included in the quantities shown in the following table specifying the rate at which the aggregate and cut-back asphalt

Number	Aggregate No. 9 Lbs. per Sq. Yd.	Aggregate No. 12 Lbs. per Sq. Yd.	Cut-back Asphalt Gal./Sq. Yd.
1	15 to 17	50 to 54	0.75 to 0.80
2	25 to 27	40 to 43	0.70 to 0.75
3	30 to 33	45 to 48	0.80 to 0.85
4	75 to 78	0 to 0	0.70 to 0.75

shall be applied:

Any treatment choice of No. 1, 2, 3 or 4 is specified according to the condition of the road and the kind of traffic.

★ Worn pavement is carefully patched and levelled prior to retreatment



As soon as the tack coat is applied the quantity of aggregate specified for the particular type of treatment is spread uniformly. The coarser aggregate is spread first and then covered with the fine aggregate.

It is required that the pavement be clean and dry at the time any work is carried on. Aggregates must be reasonably dry at the time of manipulation.

Materials Mixed in Place

The procedure in use by the MacDougald Construction Company is to thoroughly mix the aggregates using a mixing and levelling maintainer pulled by a crawler type tractor. This process results in a very thorough mixing and also allows aeration and drying whenever aggregates are damp. The final stage of mixing of the dry aggregates results in their being spread uniformly across the pavement in a width equal to the spread of the distributor spray bars. Cut-back asphalt is then applied uniformly by the distributor at the rate called for in the specifications.

Care is taken to prevent excessive deposits of bituminous materials upon the road such as might be caused by stopping or starting the:

★ Proper quantities of coarse and fine aggregates are windrowed evenly after pavement surface has been primed. The mixing and levelling maintainer makes enough passes to thoroughly mix aggregates and spreads them in uniform layer almost pavement width.

★ Too damp materials are also dried and aerated with maintainer

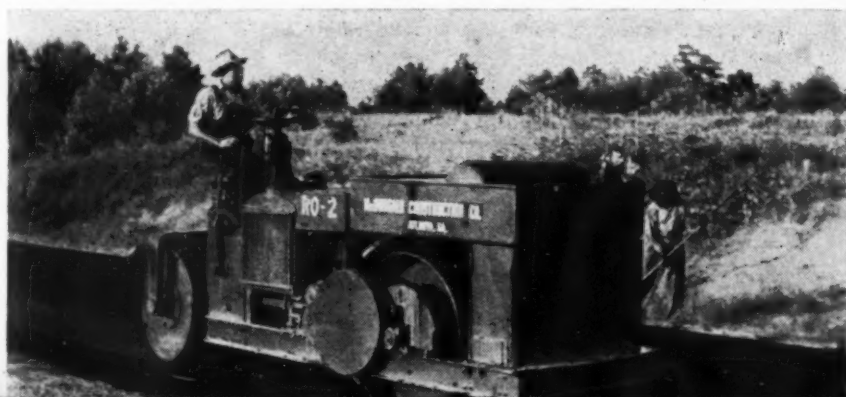
distributor or by leakage. This precaution is taken to prevent possible bleeding of fat spots at a later date.

The leveler and maintainer again mix the material following close behind the distributor. Sufficient passes are made so that the aggregate attains a uniformly black color. Manipulation is carried on until all brown spots or streaks have disappeared. The mixing process is often speeded up by the use of one or more motor patrol graders in addition to the mixing and levelling maintainer.

Special Spreader Used

The final mixing and spreading are accomplished through the use of an ingenious outfit developed by South Carolina state highway personnel. As is shown in the accompanying photographs, this machine is pulled by a heavy tractor and consists of two standard mixing and levelling machines fastened together side by side and to which is attached a strike-off board having the proper width and crown. The method of fastening the two mixing and levelling machines together and the addition of the strike-off board are the result of the ingenuity of the state highway engineers. This machine, in addition to again thoroughly mixing the material, leaves it to a very uniform grade and cross-section ready for rolling. Hand raking is resorted to, to remove any slight irregularities which the machine may leave. The roller follows immediately behind the spreader. By the use of water to keep the rollers clean, it has been found possible to open the road to traffic as soon as 24 hours after laying. Where kerosene is used for cleaning the rollers, it has been general practice to allow at least 72 hours to elapse before allowing traffic on the road.

★ Roller follows immediately behind spreader. Pavement is ready for traffic soon after rolling



★ One of the pressure distributors used to apply an RC asphalt to mixed aggregates

★ Mixing and levelling maintainer, often supplemented by motor patrol, thoroughly mixes asphalt-treated aggregates

Long-Range Program

The state of South Carolina is developing a large mileage of heavy duty road through its retreatment program. The first step in the con-

struction of such a road is usually a surface treatment on a sand-clay base. As soon as traffic has disclosed a sufficient number of weak places in the surface treatment, the road is patched and given a retreatment which adds approximately $\frac{3}{4}$ in. to its thickness at a relatively small cost.

It can readily be seen that by the time such a road has received 3 or 4 retreatments, most of the weak spots have been eliminated, the base course highly consolidated, and the thickness of the pavement increased materially. This type of pavement improves in riding quality and bearing power as time goes on. The state's maintenance engineers, however, feel that it will be

(Continued on page 87)

★ Up Isn't Out In Virginia

It is known from personal observation that R. P. Ellison, in writing his article for this issue of *Roads and Streets*, "Virginia Looks Ahead," has been very modest in his description of the career aspect of working for the Virginia Department of Highways. Mr. Ellison neglects to say that he himself was one of those receiving a "Certificate of Appreciation" and "Badge of Merit," for 35 years service. Mr. Ellison, a former field engineer with the department, in his position of Executive Assistant to the Commissioner, typifies department policy.

Engineers fill all administrative positions in Virginia's highway department. This is in accordance with Commissioner J. A. Anderson's belief that it is much easier for engineers to learn the specialized administrative duties of the department than it is for people with specialized training to understand the ramifications of the highway department's work. Judging from the high employee morale and efficiency as well as from the very high esteem in which the department is held by contractors and materials men alike, this practical use of engineers' talents must have considerable merit.

The most heartening thing to us, however, is the realization that highway engineering can be made a career service. Here is a working example of men who are able to take advantage of continuity of policy and made full use of lessons learned by experience. In our opinion men secure in the knowledge that faithful service will surely be rewarded by continued employment and advancement cannot help but give more to their jobs and must be less susceptible to pressure of various kinds.

The record of 485 long-time employees by itself may not be unusual, but when taken together with the degree of security attendant to top-side jobs must be a record of some kind. Virginia has had only four highway commissioners in 40 years, each one of which has kept the job as long as he liked.

C. S. Mullen, chief engineer, with

37 years' service and dean of the nation's highway engineers, A. H. Pettigrew, right-of-way engineer, W. R. Glidden, bridge engineer, J. J. Forrer, maintenance engineer and T. F. Loughborough, construc-

tion engineer, with 38, 30, 28 and over 25 years service, respectively, are indisputable evidence that "up" isn't the way "out" in this organization as is all too often the case in public service.

★ 1360 Lives Saved — You or Me?

We note with great interest the Automotive Safety Foundation's recent safety bulletin. Their pride in being able to announce that fatal accidents have dropped below the 1941 figure for the second consecutive month is very understandable. It is gratifying to learn that the impetus which the President's Highway Safety Conference has placed behind highway safety efforts has resulted in definite action on the part of 28 states which have either held or announced their intention to hold state-wide safety conferences as recommended in the President's safety report.

Statistics are cold reading but it doesn't take much imagination to

picture the grief and heartache, let alone suffering and expense which have been spared no telling who, by the 8% reduction in traffic fatalities which have been accomplished in the first 6 months of this year as compared with the same period in 1941.

The Automotive Safety Foundation rightly points out that to hold the accident rate below the 1941 total, continuous concentrated effort on the part of states and cities is essential since the months with the high accident rate are yet to come. They point out that in the last 6 months of 1941 nearly 23,000 persons were killed in traffic accidents as compared with 17,000 in the first 6 months of that year.

★ Maintenance Costs up, Too

Everywhere that two or more men in the road business get together they immediately start talking about contractors' bid prices. Less often publicized is the fact that maintenance and repair costs have crept up, too, although not quite in proportion.

A reminder of this important fact comes from a Texas news item, which reported that the state highway department's appropriation for the fiscal year beginning September 1, is a million dollars or higher than for the preceding year. The total road maintenance budget will be \$10,943,000. Commission Chairman John Redditt explains that \$800,000 of the increase is due to the addition of 555 miles to the state system, mostly farm-to-

market roads. Rising costs of materials, equipment and salaries add another \$230,000. These figures don't take in "maintenance betterment" which will require another three million dollars for Texas' 26,000 mile state system.

Assuming that such costs have come up gradually in the last few years, this additional increase is still small potatoes compared with the increased costs which must be shouldered by contractors, who have to battle unions, compete for skilled (?) laborers, and undertake grave risks including time penalties on deliveries. The public cannot afford the dangerous and unsatisfactory conditions that will come if maintenance is not kept up — or rather caught up. Road and

street departments had better think twice and ask for adequate funds for 1947.

On City-County Finances

We are indebted to a bulletin from the Louisville Area Development Association for an interesting discussion of municipal finances. Acknowledging the recent outcries by public officials that tax receipts are insufficient to meet the demand for public services, this bulletin briefly informs Louisville citizens about the money situation in the city and county — where revenue is coming from, how money is expended, etc.

The bulletin also passes along the following timely comment on metropolitan finances, by Harland Bartholomew, well known city planner:

"One of the great stupidities in our present system of urbanization and taxation is the inequity created between central urban and suburban development. We have subsidized this development at the expense of the centrally located property of the main city. It makes no difference whether these subsidies are furnished in the form of street improvements and maintenance by county government, or in furnishing certain public services such as water, sewers, fire protection, or schools below cost. When the urban area is broken up into numerous political jurisdictions, the inequities of the tax situation become greater and greater. Without attempting to look deeply into this question, it is apparent that suburban communities enjoy innumerable services daily at the expense of the taxpayers of the central city.

Millions of suburban dwellers in the ninety some odd, so-called metropolitan districts make daily use of streets in the central city which have been widened and developed with special lighting, traffic signals, and police protection to accommodate them. Food inspection, building inspections, and countless other services are at their disposal in the central city. The water supply system and sewer system have to be designed to accommodate this daily population load. The public library, museum, airport, and other public institutions are available to all of these suburban dwellers at little or no expense. Daily the situation is becoming more complicated."

This bulletin highlights to Louisville citizens what other cities are

doing to offset the rising costs of government and to equalize tax burdens. Many cities are increasing prices to suburban residents for city services. San Francisco increased water rates to users outside the city. In St. Paul, Minnesota, officials are considering raising charges for water, sewer and fire protection services outside the city. Denver is currently engaged in a dispute with adjacent communities which have asked for city water but prefer not to be annexed to the City — a controversy which is duplicated in Louisville by disputes over sewer services. Householders outside the corporate limits of Boulder, Colorado, now pay twice as much for use of city sewer connec-

tions as city residents; Jacksonville, Fla., has refused to extend the city sewer system beyond the corporate limits. These are only a few examples of ways in which other cities are attempting to meet the problem.

Philadelphia in 1940, and Toledo only last March, adopted City income payroll taxes in an attempt to provide adequate funds for city services. California municipalities now receive a portion of the state gas tax which is returned to them to aid in street construction. Michigan cities are waging a campaign for prompt state legislation to provide increased revenue for municipalities.

★ A Dusty Year

From Minnesota and Vermont and several other states this summer came apologetic bulletins, copies of releases to the local traveling public in which the poor benighted highway department explains why dust laying chemicals were not being applied as usual along the roads past the good rural voters' homes. Chloride shipments came through much too slowly and in too reduced quantities to meet the summertime demand, it seems. Vermont, for example, had orders in for 3700 tons of calcium chloride

with four different firms. Only 2600 tons were counted on.

A combination of calcium chloride and salt was tried as a dust layer and also light road oil used increasingly.

It is all just part of this screwball year of shortages. When the war boom was on and trainloads of everything were diverted to make munitions we could understand shortages. But now the public is bewildered. It is a wise highway department that takes time to explain intelligently.

★ Strong County Organizations Needed

County or farm-to-market roads, notes the American Road Builders, at long last have their place in the sun. Under the Federal-aid Act of 1944, effective with the termination of hostilities, \$150 millions of the first half billion dollars appropriated, were earmarked for secondary highways. Since the government funds are to be matched by the states, \$300 million was available during the first fiscal year ending June 30. Now in the second year, the counties have \$600 million in their bankroll. While it will only start an important job, it is significant in that the need for better farm roads has received recognition by Congress, the American Road Builders' Association

points out.

It is not the first time government funds have been available for this type of road, but never before in such figures. Administering secondary projects commensurate with the need and the money at hand calls for high quality of engineering and administration. The farm-to-market construction program must have cooperation between county and state highway departments. It is a joint venture in which the interests of both secondary and primary systems must be safeguarded so that the public will get full value for its construction dollar.

State highway departments have
(Continued on page 78)

Massive New Runway

Under Construction at Wright Field for the B-36 and its kind

GROUND breaking ceremonies were held recently at Patterson Field, near Dayton, for what will be the largest single concrete runway ever built and the third concrete runway to be undertaken in this country for planes in the 300,000-lb. classification.

Located in Patterson Field, (or to be technically up to date), Area C of Wright Field, this runway will serve the Air Materiel Command's activities. The installation will comprise a single runway 10,000 x 300 ft. with provisions for future widening to 500 ft., and a parallel taxiway 150 ft. wide. The runway slab will have a uniform depth of 21 in., the taxiway and connecting warm-up area, 25 in. About 350,000 cu. yd. of concrete is to be placed — equivalent in value to that required for 125 miles of ordinary 2-lane highway. In addition to the quantities given above, the job will include a high-intensity lighting system, 800,000 sq. yd. of topsoiling, 171 acres of

fertilizing, seeding and mulching.

In contrast with the heavy runway at Fort Worth, from which the B-36 recently took off for its initial flight, the Wright Field pavement will have comparatively simple base construction. The Texas runway [see "Massive Slabs for Southwestern Airfield", Roads and Streets, Sept., 1945] is underlaid by several definitely indicated layers of select material rolled to specified densities, in addition to a sub-soil layer rolled in place before placing sub-base layers.

The soil at Wright Field is irregular, composed of strata and pockets of clay, silt and gravelly material, as is often the case in a flat flood plain. Comparatively shallow grading is involved, the contractor having only about 700,000 cu. yd. of earth to move for the entire field. His problem is to accomplish proper mixing of clay and granular materials, the latter being found in pockets. With proper mixing it is understood that the U. S.

Engineers expect little difficulty in obtaining the 95% modified AA-SHO density specified under paved areas. Because of the soil variation and frequent changes in moisture encountered, Proctor tests are being run on each soil sample taken which contains appreciable gravel.

Compaction methods are left largely to the contractor, who is using an extra heavily weighted sheepsfoot (about 450 psi.), for the first passes of each lift, followed by a lighter unit. While lifts are specified to be in 9 in. max. layers, the contractor has found it economical to use thinner layers.

Handling surface run-off is the principal drainage problem at the field. About 31,000 lin. ft. of extra-heavy reinforced concrete pipe storm sewers are being installed. The gravelly material found at trench depth makes an ideal bed for the pipe, which is being installed by ordinary methods using a mechanical ditcher and a drag-line for trenching and handling

Picture of the Month

This widely publicized photograph recently revealed to the nation that the huge B-36, world's largest land based airplane had been trundled out of its secret hangar at Fort Worth and given a successful trial run. To airport designers, this means that the day of the 300,000 lb. plane is no longer of the future. It is here! And still bigger planes are on the drafting board — one is to have a spread of 200 ft. between landing wheels, it is rumored.

When will the dinosaurs quit growing? That can't be answered, but meantime there are more urgent questions for "Roads and Streets" readers: Where will such planes land? How long, wide and thick must the runways be built? The accompanying article describes the U. S. Engineers' answer for the conditions at Wright Field.



pipe. Where trenches are deep a bulldozer is used to take off the first two or three feet of material, to reduce the cut for the ditcher.

No Expansion Joints

The pavement is to be built without expansion joints. The slabs for both the runway and the taxiway will be placed in 25-ft. lanes, with weakened plane dummy joints spaced every 25 ft. by the contractor who has an optional range of 20 to 25 ft. Dowels will be used in place of the customary keyed construction at longitudinal or lane edges, however. Dowels will consist of 2½-in. diam. solid steel bars 30 in. long, spaced on 18-in. centers. Over 140,000 dowels will be required. A dowel of this design weighs about 30 lb. and dowel placement looms as one of the major tasks facing the contractor.

Since dowels will have to be inserted through holes in the concrete forms, special forms will be needed, for this reason alone. The usual 10-ft. form panel has three stake brackets, located normally in such a position that they would interfere with dowel spacing through the forms. The unusual slab thickness also imposed a special forming requirement. A leading manufacturer of forms is understood to be making forms of a special design for this job. Forms if accepted will be 12 ft. long, constructed to an L-shaped design with 21 and 25 in. sides, so that either side will serve as a base while the other is used for the thickness of

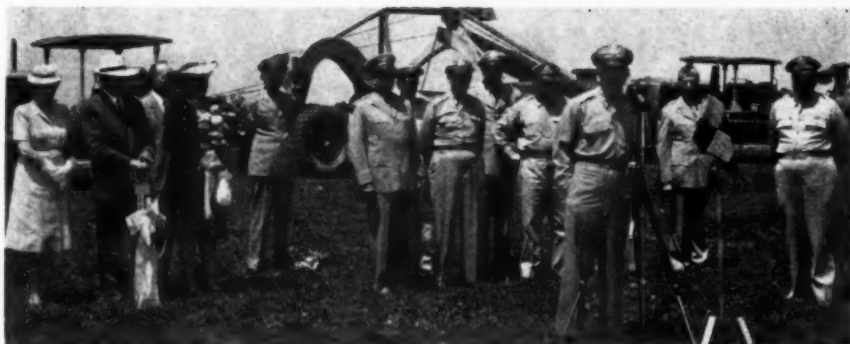
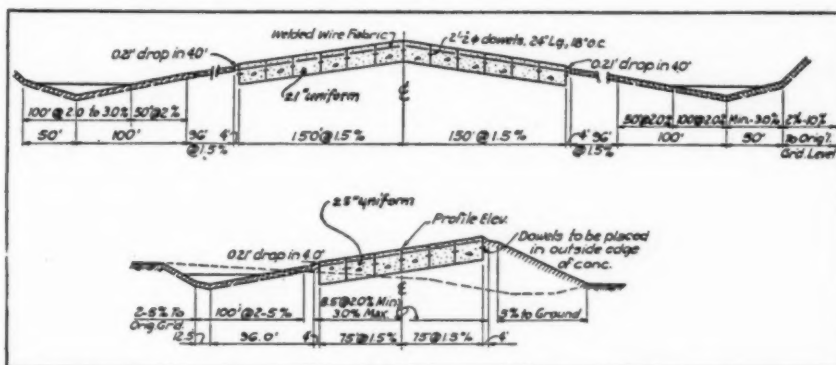


Photo Air Materiel Command

Ground Breaking.

Lt. General Twining greets guests at the ground-breaking ceremony of the super runway at Patterson Field. Left to right: Mrs. Criswell, Mr. Fred I. Rowe, General Manager of the Johnson Construction Co., Mr. B. H. Criswell, Superintendent, Mrs. Rowe, Lt. Col. Nottingham, Col. B. C. Dunn, Col. J. Griggs, Col. D. G. Lingle, Col. F. J. Hills, Col. P. E. Burrows, Lt. Gen. Twining, Lt. Col. Kibler, Col. Joseph T. Morris



★ Details of runway slab (top) and slab for taxiway and warm-up area

slab required. Forms will weigh in the neighborhood of 1,000 lbs. each.

Air Entraining Concrete

Air entraining concrete is specified under a specification calling for
(Continued on page 108)

Acme Photo



CAA Announces \$30,822,750 For States

District Offices selected and operational plan outlined as airport plans get under way

THE Civil Aeronautics Administration, taking advantage of its belated operating appropriation, is rapidly putting its house in order. Charles B. Donaldson, Assistant Administrator for Airports, recently announced apportionments to the states of \$30,822,750 appropriated by Congress for airport construction and development during the fiscal year ending July 1, 1947. A tabulation of the apportionment accompanies this article.

Districts Organized

In discussion of engineering and organization plans with Phillips Moore, CAA's Director of Airport Engineering, it was learned that locations have been chosen for 43 district offices in the U. S. and 3 in the territories. A tabulation of these offices giving the location and the extent of the territory served by each office is also given. This tabulation gives the names and addresses of the Regional Airport superintendents under whose supervision each district office comes.

Decentralized Organization

Policy-making specialists staff CAA's Washington office of the Airport Service. "Charlie" Donaldson, with Assistant Administrator status, heads up the organization. Directly under him are the Airport Engineering and Airport Planning divisions.

The Airport Engineering division is divided into four sections; soils and paving, lighting, buildings, and turfing. The Planning division is also divided into four sections; planning, facility records, management and operation, and project control.

Each regional office will be an expanded counterpart of the Washington office and will be concerned largely with administrative matters and the review of detail plans prepared by its district offices.

The district office personnel will

do the spade work. In addition to the district engineer and his assistant, each district office will be staffed with experts to handle special phases of airport design, construction, maintenance and operation. A liaison officer will handle all matters pertaining to leases, easements, agreements, and land purchases. There will be a disposal engineer who will work with the War Assets Administration in the disposal of surplus military airport property and equipment. This official will prepare lists of surplus equipment suitable for use in civilian aviation and attempt to have it placed where it will serve the best purpose. The maintenance of current records of all airports, giving size and activities, will be the function of the facility records engineer. Grading, drainage, and paving plans as well as construction and maintenance practices will be passed on by the paving engineer. Lighting matters will come under the district lighting engineer.

Should Contact District Offices

Phillips Moore reiterated CAA's previous advice to all sponsors or persons having airport problems to save both themselves and CAA time and effort by taking such matters directly to the district or regional office concerned. Since nearly all matters will have to be referred to the district office eventually it is the preferable one to contact. It is expected that the district offices will be staffed and the personnel trained before September 1.

Until such time as the name and office address of each district office is available, mail sent to the proper postoffice and addressed "District Airport Engineer, Civil Aeronautics Administration, U. S. Department of Commerce" will be promptly delivered.

Preparing National Plan

The first job being undertaken is the preparation of the national air-

port plan in accordance with the requirements of the airport act. CAA has set October 15 as the date when it will have the plan completed. It will then be in a position to act on sponsors' applications.

Each district office will prepare a district plan for the area under its jurisdiction. This work will be carried on in cooperation with the state and local aviation officials involved.

On receipt of the district plans, the regional office will compile them into a regional plan. The Washington office will, in turn, compile the regional plans into a national plan.

3 Year Forecast

The airport plan will attempt to forecast airport needs for the next 3 years. The plan will be revised each year on the same basis. The airport act stipulates that only those airports shown on the current plan will be eligible for federal aid.

Based on Useful Hints

CAA will continue to use its "useful unit" idea in project approval. This procedure has the advantage of allowing a project to be undertaken piecemeal or in stages and still insure a definite operational use for such work as is accomplished. As an illustration the master plan may call for three paved and lighted runways with a complete taxiway system and parking apron as the ultimate development. It can readily be seen how this project can be broken down into several useful units. The basic unit would be grading, draining and turfing the runway into the prevailing wind, and would allow limited use of this runway. Similar work on each of the other runways would constitute a useful unit as would paving or lighting the first runway. In this manner of approval, funds for carrying out the entire project do not have to be available before the project is started.

Proper evaluation of each useful unit will result in securing the most use for each dollar spent and will allow the airport program as a whole to progress evenly and more in accordance with the present needs.

Region I — W. E. Cullinan, Airport Engineer, 385 Madison Avenue, New York 17, N. Y. Phone: Plaza 5-5662
Dist. 1 — Augusta, Maine (Maine, New Hampshire and Vermont)

Dist. 2 — Boston, Mass. (Massachusetts)
 Rhode Island and Connecticut)
 Dist. 3 — Albany, N. Y. (New York)
 Dist. 4 — Harrisburg, Penna. (Penna.)
 Dist. 5 — Trenton, N. J. (New Jersey)
 Dist. 6 — Baltimore, Md. (Maryland and
 Delaware)
 Dist. 7 — Richmond, Va. (Virginia)
 Dist. 8 — Charleston, W. Va. (West Vir-
 ginia)

Region II — H. Harvey Perkins, Air-
 port Engineer, 84 Marietta Street, Atlanta 3.

Ga. Phone: Walnut 5200
 Dist. 1 — Montgomery, Ala. (Alabama)
 Dist. 2 — Jacksonville, Fla. (Florida)
 Dist. 3 — Atlanta, Ga. (Georgia)
 Dist. 4 — Jackson, Miss. (Mississippi)
 Dist. 5 — Raleigh, N. C. (North Carolina)
 Dist. 6 — Columbia, S. C. (South Carolina)
 Dist. 7 — Nashville, Tenn. (Tennessee)
 Dist. 8 — San Juan, Puerto Rico, Walter
 Reich, District Engineer

Region III — Lane W. Wilcox, Air-

port Engineer, Room 1017-A Insurance Ex-
 change Bldg., 166 W. Van Buren, Chicago, Ill.
 Dist. 1 — Bismarck, No. Dak. (North Dakota)
 Dist. 2 — St. Paul, Minn. (Minnesota)
 Dist. 3 — Madison, Wis. (Wisconsin)
 Dist. 4 — Springfield, Ill. (Illinois)
 Dist. 5 — Indianapolis, Ind. (Indiana)
 Dist. 6 — Frankfort, Ky. (Kentucky)
 Dist. 7 — Columbus, Ohio (Ohio)
 Dist. 8 — Lansing, Mich. (Michigan)

Region IV — S. E. Travis, Airport En-

FEDERAL-AID AIRPORT PROGRAM: STATE APPORTIONMENTS OF FEDERAL FUNDS APPROPRIATED FOR FISCAL YEAR 1947

State	STATE RATIO TO TOTAL UNITED STATES POPULATION (1940 Census)			STATE RATIO TO TOTAL U. S. LAND and WATER AREA			STATE PERCENTAGE and APPOR- TIONMENT OF AUTHORIZED FUNDS		
	Population	Ratio %	APPORTIONMENT	Area	Ratio %	APPORTIONMENT	Ratio %	APPORTIONMENT	Rank
U. S. Totals:	131,669,275	100.000000	\$15,411,375	3,096,751	100.000000	\$15,411,375	100.000000	\$30,822,750	
Alabama	2,832,961	2.151573	331,587	52,169	1.684637	259,626	1.918105	591,213	20
Arizona	499,261	0.379178	58,437	113,909	3.678339	566,883	2.028758	625,320	16
Arkansas	1,949,387	1.480518	228,168	53,102	1.714765	264,269	1.597642	492,437	35
California	6,907,387	5.246013	808,483	158,762	5.126728	790,099	5.186370	1,598,582	3
Colorado	1,123,296	0.853119	131,477	104,247	3.366335	518,799	2.109727	650,276	15
Connecticut	1,709,242	1.298133	200,060	5,582	0.180253	27,779	0.739193	227,839	44
Delaware	266,505	0.202405	31,193	2,407	0.077727	11,979	0.140066	43,172	49
Dist. of Columbia	663,091	0.503604	77,612	69	0.002228	343	0.252916	77,955	48
Florida	1,897,414	1.441045	222,085	60,295	1.947041	300,066	1.694043	522,151	32
Georgia	3,123,723	2.372401	365,620	58,924	1.902768	293,243	2.137585	658,863	14
Idaho	524,873	0.398630	61,434	83,557	2.698215	415,832	1.548422	477,266	37
Illinois	7,897,241	5.997786	924,341	57,926	1.870541	288,276	3.934163	1,212,617	5
Indiana	3,427,796	2.603338	401,210	36,519	1.179268	181,741	1.891303	582,951	21
Iowa	2,538,268	1.927760	297,094	56,280	1.817389	280,085	1.872574	577,179	22
Kansas	1,801,028	1.367842	210,803	82,276	2.656849	409,457	2.012346	620,260	18
Kentucky	2,845,627	2.161193	333,070	40,395	1.304432	201,031	1.732813	534,101	28
Louisiana	2,363,880	1.795316	276,683	49,539	1.599709	246,537	1.697513	523,220	31
Maine	847,226	0.643450	99,164	34,317	1.108161	170,783	0.875805	269,947	43
Maryland	1,821,244	1.383196	213,170	12,303	0.397287	61,227	0.890241	274,397	42
Massachusetts	4,316,721	3.278457	505,255	9,216	0.297602	45,865	1.788030	551,120	26
Michigan	5,256,106	3.991900	615,207	96,791	3.125566	481,693	3.558733	1,096,900	6
Minnesota	2,792,300	2.120692	326,828	86,280	2.786146	429,383	2.453419	756,211	10
Mississippi	2,183,796	1.658546	255,605	48,272	1.558795	240,232	1.608671	495,837	34
Missouri	3,784,664	2.874372	442,980	69,674	2.249906	346,741	2.562139	789,721	9
Montana	559,456	0.424895	65,482	147,138	4.751367	732,251	2.588131	797,733	8
Nebraska	1,315,834	0.999348	154,013	77,237	2.494130	384,380	1.746739	538,393	27
Nevada	110,247	0.083730	12,904	110,540	3.569548	550,115	1.826639	563,019	23
New Hampshire	491,524	0.373302	57,531	9,304	0.300444	46,303	0.336873	103,834	45
New Jersey	4,160,165	3.159556	486,931	8,220	0.265439	40,908	1.712497	527,839	29
New Mexico	531,818	0.403904	62,247	121,666	3.928827	605,488	2.166365	667,735	13
New York	13,479,142	10.237120	1,577,681	53,952	1.742213	268,499	5.989666	1,846,180	2
North Carolina	3,571,623	2.712571	418,044	52,712	1.702171	262,328	2.207371	680,372	12
North Dakota	641,935	0.487536	75,136	70,665	2.281908	351,673	1.384722	426,809	39
Ohio	6,907,612	5.246184	808,509	44,679	1.442770	222,351	3.344477	1,030,860	7
Oklahoma	2,336,434	1.774472	273,471	69,919	2.257818	347,961	2.016145	621,432	17
Oregon	1,089,684	0.827592	127,543	97,029	3.133252	482,877	1.980422	610,420	19
Pennsylvania	9,900,180	7.518975	1,158,779	46,068	1.487624	229,263	4.503299	1,388,042	4
Rhode Island	713,346	0.541771	83,494	1,228	0.039654	6,111	0.290713	89,605	47
South Carolina	1,899,804	1.442861	222,365	31,193	1.007281	155,236	1.225071	377,601	40
South Dakota	642,961	0.488315	75,256	77,047	2.487995	383,434	1.488155	458,690	38
Tennessee	2,913,841	2.214519	341,288	42,246	1.364204	210,243	1.789361	551,531	25
Texas	6,414,824	4.871922	750,830	267,346	8.633113	1,330,481	6.752518	2,081,311	1
Utah	550,310	0.417949	64,412	84,916	2.742100	422,595	1.580025	487,007	36
Vermont	359,231	0.272828	42,047	9,609	0.310293	47,820	0.291560	89,867	46
Virginia	2,677,773	2.033711	313,423	42,326	1.366787	210,641	1.700249	524,064	30
Washington	1,736,191	1.318600	203,214	70,589	2.279453	351,295	1.799027	554,509	24
West Virginia	1,901,974	1.444509	222,619	24,181	0.780851	120,340	1.112680	342,959	41
Wisconsin	3,137,587	2.382930	367,242	66,216	2.138241	329,532	2.260586	696,774	11
Wyoming	250,742	0.190433	29,348	97,914	3.161830	487,281	1.676132	516,629	33

Federal Aid Airport Program Appropriation - Fiscal year 1947. \$45,000,000

For projects in Alaska, Hawaii and Puerto Rico 1,740,000

Net total for projects in the United States. \$43,260,000

Administrative Expenses, 5% \$ 2,163,000

Discretionary Fund, 25% of balance. 10,274,250 *

12,437,250

For apportionment for projects in the States
 according to Population Ratio \$15,411,375

For apportionment for projects in the States
 according to Land and Water Area Ratio 15,411,375

\$30,822,750

* Available for distribution as determined by the Administrator, C.A.A.

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Phone: 6-2141
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Dist. 4 — Oklahoma City, Okla. (Oklahoma)
Dist. 5 — Austin, Tex. (Eastern half of Texas)
Dist. 6 — Big Springs, Texas (Western half of Texas)

Region V — Herbert H. Howell, Airport Engineer, City Hall Bldg., Kansas City, Mo. Phone: Harrison 0110
Dist. 1 — Kansas City, Mo. (Missouri)
Dist. 2 — Kansas City, Kans. (Kansas)
Dist. 3 — Des Moines, Ia. (Iowa)
Dist. 4 — Lincoln, Nebr. (Nebraska and South Dakota)
Dist. 5 — Denver, Colo. (Colorado and Wyoming)

Region VI — Robert W. F. Schmidt, Airport Engineer, 1500 4th Street, Santa Monica, Calif.
Phone: Santa Monica 4-3711
Dist. 1 — Santa Monica, Calif. (South half of Calif.)
Dist. 2 — San Francisco, Calif. (North half of Calif.)
Dist. 3 — Prescott, Ariz. (Arizona)
Dist. 4 — Salt Lake City, Utah (Utah)
Dist. 5 — Carson City, Nev. (Nevada)

Region VII — Paul Morris, Airport Engineer, Smith Tower Annex Bldg., 157 Yesler Way, Seattle, Wash., P.O. Box 3224. Phone: Main 4121
Dist. 1 — Seattle, Wash. (Washington)
Dist. 2 — Helena, Mont. (Montana)
Dist. 3 — Salem, Ore. (Oregon)
Dist. 4 — Boise, Ida. (Idaho)

Region VIII — Anchorage, Alaska, Kenneth S. Perry, Airport Engineer, c/o CAA, Anchorage, Alaska

Region IX — Honolulu — Territory of Hawaii, Tom Flaherty, Airport Engineer, P.O. Box 4009, Honolulu 12, Hawaii

Maryland County Ups Road Standards

By Lawton W. Luther

Montgomery County, Maryland, commissioners last month (September) approved and had placed in the county ordinance books a new set of minimum standards to be

followed by county builders and developers in the development and construction of roads and streets in new subdivisions.

The new standards require that all new streets shall be graded in accordance with the approved "profile," and have a minimum width of 30 ft. Adequate slopes or retaining walls must also be well placed, unless a greater width is required for sidewalks. Concrete curbs and gutters are also required on each side of the street.

Paved surfaces of such streets and roads shall have a minimum of 26 ft. between curbs and shall conform to the cross section and specifications indicated by the county engineer.

In rural type subdivisions, however, where, in the judgement of the county engineer, the county highway cross-section would be suitable, the builder may construct a street with a minimum graded roadway 24 ft. wide, plus 3-ft. ditches, making a total graded width between the two ditches of 30 ft. and a minimum surfaced width of 18 ft. Curb and gutter requirements may be waived by the county engineer in such cases.

In adopting the new standards the county commissioners announced that no permits will be issued by the county engineer for road and street construction unless the work conforms to the regulations outlined by the board.

The permits which the county engineer will issue shall state that

work to be done shall be started within 60 days and completed within a reasonable time. If this is not done, the permit becomes invalid and new permit must be obtained.

Raleigh — The North Carolina Highway and Public Works Commission ruled recently that movement of large sections of dismantled barracks and houses over state highways by trucks was "dangerous to travel" and must be stopped. Sections of buildings measuring 10 to 16 ft. wide were being moved by truck over 18-ft. highways. The purpose of the movement, to provide temporary housing, was good, it was agreed, but the commission pointed out that some other method of transportation must be used.

(Continued from page 73)

the organization and experience. Many counties have capable highway engineers and competent local administrative units. But other counties are not so fortunate. These should do something at once about expanding and developing their highway organizations. Putting an all-weather surface on 51% of 1,928,000 miles of country and local roads is a mammoth job. It will take years and billions to do it. Let's make sure that the program gets off to a good start.

Seen at Summer Meeting of National Highway Users Conference



★ Sitting, left to right: Col. Dawes E. Brisbane, research counsel, NHUC, Washington; Eugene Stuart, secretary, Louisville Automobile club (and chairman, highway safety committee); R. R. Proctor, assistant secretary, Kentucky Farm Bureau Federation, Louisville, and chairman of committee on regulation, reciprocity and uniform laws; Col. Franklin M. Kreml; speaker, director Northwestern University traffic institute; Gus Vahlkamp, general attorney, Automobile club of Missouri, St. Louis, and chairman of the meeting

★ Standing, left to right: Arthur C. Butler, director NHUC, Washington; John V. Lawrence, managing director, American Trucking Associations; Karl M. Richards, director, field services dept., Automobile Manufacturers Ass'n., Detroit; L. A. Rossman, editor, Grand Rapids, Minn., Herald-Review, and chairman of size and weights committee; Anson S. Thomas, director taxation and legislation, Indiana Farm Bureau, Indianapolis; and chairman of the committee on highway planning and finance

Virginia Looks Ahead

**\$800,000,000 to be spent under 20-year plan.
40th Anniversary of Highway Department is
occasion for taking stock of past achievements
and honoring 485 long-time employees**

By R. P. Ellison

Executive Assistant to Highway
Commissioner, Richmond

ON July 1, 1946, the Virginia Department of Highways celebrated its 40th anniversary. In 1906 a bill was presented before the State Legislature advocating the forming of a highway department for the purpose of putting into operation a planned program of road building in Virginia.

The governor as well as many senators and representatives strongly supported the bill. The opposition was led by a former governor who climaxed his speech against the bill as follows: "The people of Virginia do not want, nor will they support, a movement that will provide highways for bicycles and motor cars that will clutter up the roads and make them unsafe for the people to travel."

Even over such "strong" opposition the bill was passed and \$16,000 was allocated to cover the administrative costs of the highway department. The bill provided for the employment of a full-time engineer as commissioner and named the Professors of Engineering at the University of Virginia, Virginia Military Institute, and Virginia Polytechnic Institute as an advisory board.

The allocations to the highway department were gradually increased as "good roads" gained in popularity but no planned program of improvement could be carried on until the gasoline tax was imposed.

\$39,500,000 for 1946

Contrasted with the meagre \$16,000 in 1906 the anticipated revenue in 1946 is \$31,000,000, plus \$8,500,000 Federal-aid making a total of \$39,500,000 available for highway work during the next year. This fund must provide for the maintenance of 9,500 miles of roads in the Primary System, 37,500 miles in the Secondary System, construc-

tion and improvement on both systems and the prescribed Federal Aid Urban program in cities and towns with a population greater than 5,000. In the 40 years of operation approximately \$500,000,000 has been spent on Virginia's highways. Regardless of the fact that this vast sum was spent with long-range economy uppermost in mind, roads built many years ago for light traffic and maximum speeds of 30 mph. must now be modernized. Many miles of road must be relocated and new roads constructed. Many miles of highways whose alignment and grades are good, must be strengthened. A vast amount of improvement is needed on the secondary roads.

20 Year Plan

A 20-year plan has been formulated for the improvement of Virginia's highways. The plan represents the culmination of nine years of traffic study which has resulted in the establishment of the ultimate standard for each mile of primary highway. These routes are divided into six groups as follows:

- Routes carrying 1,500 or more vehicles per day
- 4-lane, divided, heavy duty truck routes
- 2-lane, heavy duty truck routes
- 4-lane, divided, heavy duty passenger routes
- 2-lane heavy duty passenger routes, roads carrying 500 to 1500 vehicles per day
- 2-lane, local, medium duty routes — roads carrying less than 500 vehicles per day
- 2-lane, local, light duty routes

For the secondary system the plan provides for the hard surfacing of all roads carrying 50 or more vehicles per day, stabilizing all roads carrying from 10 to 50 vehicles per day and the maintenance of all roads carrying less than 10 vehicles per day with such local material as is adjacent to the road.

This plan further provides that any citizen, or group of citizens living on a road carrying less than 10 vehicles per day can, by paying the additional cost, have their road improved to a higher type than that proposed in the 20-year program.

During the present year contracts will be awarded covering 24 million dollars worth of work on the primary system and a program is under way for the expenditure of 16 million dollars on the secondary system. All work is being done in accordance with standards set up under the 20-year, or master, plan which calls for the expenditure of \$800,000,000 in 20 years, or an average of \$40,000,000 each year.

Long-Time Employees Honored

During the festivities which marked the 40th anniversary of the highway department, "Certificates of Appreciation" and "Badges of Merit" were awarded to 485 employees who had 20 or more years in the service of the department. Of this number, 12 employees have had more than 35 years of service, 15 more than 30 years service, 73 more than 25 years service, and 385 from 20 to 24 years service. The department takes pride in this large number of veteran employees and also in the fact that its recruitment program offers the opportunity for such continuity of service.

Has Right Answers

In 1944, a "Merit Rating System" was established for state employees which provides periodical increases based on merit and fitness. Under the "Personnel Act," every employee is classified and placed in the proper grade. After reaching the maximum salary in that grade the employee cannot receive any further salary increase until promoted to a higher grade. This rarely occurs as most employees display merit and fitness to justify promotion before reaching the top salary bracket of the lower

grade.

Virginia established a retirement plan in 1942 and while the earnable compensation is low the law has been liberalized and it is reasonable to assume that future legislatures will grant further benefits in keeping with sound economic principles.

The Highway Department of Virginia can satisfactorily answer the three principal questions of prospective employees:

1. Opportunity?
2. Advancement?
3. Security?

First: Within the next 20 years there must be accomplished nearly double the volume of work done in the past 40 years. Second: Promotion and increases are awarded on Merit and Fitness. Third: Security is assured as shown by the number of veterans in the organization and by the retirement plan.

proved "An ACT to establish a State Highway System." The Act provided for appointment by the Governor of a state highway commissioner and defined the powers and duties of the commission and commissioner. George P. Coleman was appointed the first state highway commissioner.

Mr. Henry S. Shirley succeeded Mr. Coleman and served the commonwealth as commissioner until his death on July 16, 1941.

A Word About Virginia's Highway Commissioners

ON August 1, 1941, General James Aylor Anderson became the fourth state highway commissioner which the Virginia Department of Highways has had in its 40 years of existence. Born at Linden, Va., December 26, 1892, he graduated from Virginia Military Institute with first honors in 1913, receiving the Jackson-Hope medal therefor. He later attended Cornell University where he received his degree in Civil Engineering.

General Anderson has a distinguished military career, having served during the first world war as Major and Lt. Col., QMC, 30th Division; First Army Headquarters of 7th Corps Headquarters; Army of Occupation; District Officer, 30th Division. He was in Operations Section of the General Staff, First Army; Administrative Supervision Section of the General Staff, 7th A. C.

After his discharge from the military services he returned to VMI as Adjunct Professor of Civil Engineering and Drawing. In 1920 he was advanced to the grade of Associate Professor and placed in charge of the Civil Engineering Department. General Anderson served as Town Engineer of Lexington, Va., in 1922 and 1923, and in 1924 he was advanced to the grade of Professor. In 1933 VMI granted him leave of absence to serve as state director for the Public Works Administration, until 1936. Upon his return to VMI he was made head of the Civil Engineering Department and appointed Academic Executive or Dean of the Faculty in November, 1937. He served in



Photo by Foster Studio, Richmond, Va.
General J. A. Anderson

this capacity until he was appointed Highway Commissioner.

The Department's first commissioner of highways was Capt. P. St. Julian Wilson, who served from July 1, 1906 to December 15, 1913, at which time he resigned to become chief engineer of the Federal Bureau of Public Roads.

Mr. George P. Coleman succeeded Capt. Wilson served until his resignation on January 15, 1923. He took the good roads movement to every part of the state while at the same time playing a major role in the creation of the National Highway System. He was the second president of the American Association of State Highway Officials and Chairman of the Committee that provided the first Federal-aid road bill. In January, 1918, the General Assembly of Virginia ap-

Meetings Ahead

Highway Research Board; 26th Annual Meeting, at National Academy of Sciences and the National Research Council, Washington, D. C., Dec. 5-8.

Society for Experimental Stress Analysis, Hotel New Yorker, New York, N. Y., Dec. 9-11.

Southern Michigan Road Commissioners Assn., Pantlind Hotel, Grand Rapids, Mich., Dec. 11-12.

American Association of State Highway Officials; annual meetings Biltmore Hotel, Los Angeles, Calif., Dec. 17-20.

American Road Builders' Association, 44th annual convention, Palmer House, Chicago, Feb. 17-20, 1947.

Accident Data from South Carolina

In "Facts About Traffic Accidents" (1945), South Carolina reports 2508 traffic accidents in which 450 people were killed. This was an increase of 47% over 1944. There were 7 accidents for each 1000 vehicles registered in the state — 2.5 deaths for each 100 miles of highway! Estimated economic loss was \$4,191,500, with an average cost per accident of \$1,671.25. 1129 of these accidents, 178 of them fatal, occurred at night on unlighted streets and highways. In the period from 3 to 4 A.M. one out of every three accidents resulted in death. 52 out of every 100 accidents and 55% of the fatalities occurred at night. Accidents in which pedestrians were involved claimed more deaths than any other type, 138 pedestrians being killed and 148 injured. Statistics for the 8 year period, 1938-1945, show that there is an average of 1 death for each 6 accidents.

("Newsletter" from the Street and Traffic Safety Lighting Bureau, New York City.)



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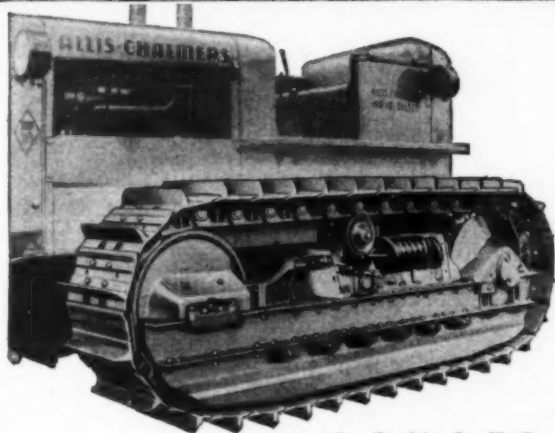
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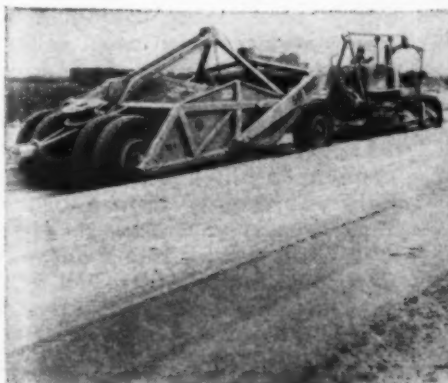
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The Basic Cause of Inflation

By Halbert P. Gillette

IN A RECENT article in Saturday Evening Post, Frank Albert Fetter, Professor Emeritus of Political Science at Princeton University, said:

"The real cause of inflation is well known alike to students of theory and to practical financiers. Without the shadow of a doubt, that cause is the enormous increase in money and of bank demand deposits. . . . Money of all kinds in circulation was less than \$6,000,000,000 in 1933, and by 1945 had increased to \$26,000,000,000. Bank deposits subject to check on demand were \$15,000,000,000 in 1933, and \$106,000,000,000 in June 1945. Nothing comparable has ever occurred before in our financial history."

In an article published a year ago I pointed out that per capita money outside the Treasury increased about 60% during World War No. 1, yet wages increased nearly 75% whereas the corresponding increase in per capita money during World War No. 2 was 174%. It was also pointed out that while factory and construction wages had doubled during the last war, they probably would eventually rise much more in the course of the next few years. The basis for that forecast was the fact that between 1849 and 1929 average factory wages had kept pace with per capita money outside the Treasury, and had risen 350%, since 1929 that per capita money has risen another 325%.

In the second chapter of my Handbook of Construction Cost (1922) it was pointed out that for more than a century average wages in America had lagged but little behind each increase in per capita money. This law continued to hold until 1933 when President Roosevelt cut the weight of the gold dollar 40% an unprecedented act that so badly frightened investors that the depression was prolonged. Our entrance into the war was followed by a federal attempt to control wages which was partly successful, especially as to "white collar employees." Hence, there has been a repression of wages such as to prevent the full effect of the increase in money. For this reason I look to see average wages become about

four times what they were in 1929. Between 1849 and 1929 average wages, following per capita money, became 4.5 times those of 1849. Had it been forecast in 1849 that the then annual factory wage of about \$250 would become about \$1200 within 80 years, few would have believed it possible. Yet 2000 years ago a Roman writer had called attention to the fact that when Roman legions returned with much captured silver, wages and prices soon became higher. But few people as yet know these two basic economic laws: (1) The trend of average wages is that of per capita money. (2) The trend of average commodity prices is that of wages divided by the productivity of the average worker.

Productivity per American worker has doubled about every 50 years, resulting in average prices being half what they would have been had no increase in productivity occurred. Increase in American productivity has been mainly due to the originality of scientists, inventors, engineers and executives. No great and prolonged increase in human productivity occurred anywhere until James Watt invented the condensing steam engine in 1765. That was as epochal a date in applied science, as was 1609 in pure science when Galileo reinvented the telescope.

"We hear much talk of the wage-price spiral, as if increasing wages and prices were the mutual causes of each other," says Prof. Fetter, "but the real cause is outside the spiral; it is the excessive supply of money." We hear much also about a prospective great decrease in commodity prices when full productivity of our factories returns; but that, too, is an illusion. Increase in productivity per factory worker is a relatively slow process, usually resulting from better machinery and increased use of power. Farm productivity per worker likewise increases only at a slow pace — much slower than that in factories and mines.

Prof. Fetter suggests restoring the weight of the gold dollar to its pre-1933 value, as one way of reducing wage and price inflation. But the immediate effect of such an act might be as disastrous as it was when its converse was in-

voked in 1933. He suggests retiring bonds as a device for reducing Federal Reserve Notes in circulation, but to be very effective that would involve raising income taxes that are already too burdensome. He says: "Unless Washington does something effective to stop inflation, the nation is headed for the greatest financial explosion in its history." However, "financial explosions" have not been the direct result of inflation of money, but of excessive speculation consequent upon a long period of rising prices and profits, such as between 1919 and 1929. The slight depression of 1920 is often erroneously cited as an example of great ill effects of inflation, but the really great "bust" after a "boom" did not begin till the close of 1929. That great "bust" was mainly due to excessive borrowing for speculative purposes and for unwarranted expansion of plants. A weak banking system plus President Roosevelt's "clipping" of the gold dollar greatly extended the duration of the disaster.

Missouri Requires Driver Responsibility

A new law in Missouri requires that applicants for auto licenses show proof of financial responsibility. This must be in the form of \$5,000 liability insurance covering a single person or \$10,000 for two or more persons and \$1,000 property damage coverage, or a personal statement accompanied with a deposit of surety with the state as a guarantee.

Mail Inserted Card or Inquiry Blank (page 127) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See New Construction Equipment and Materials beginning on page 115, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 127 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

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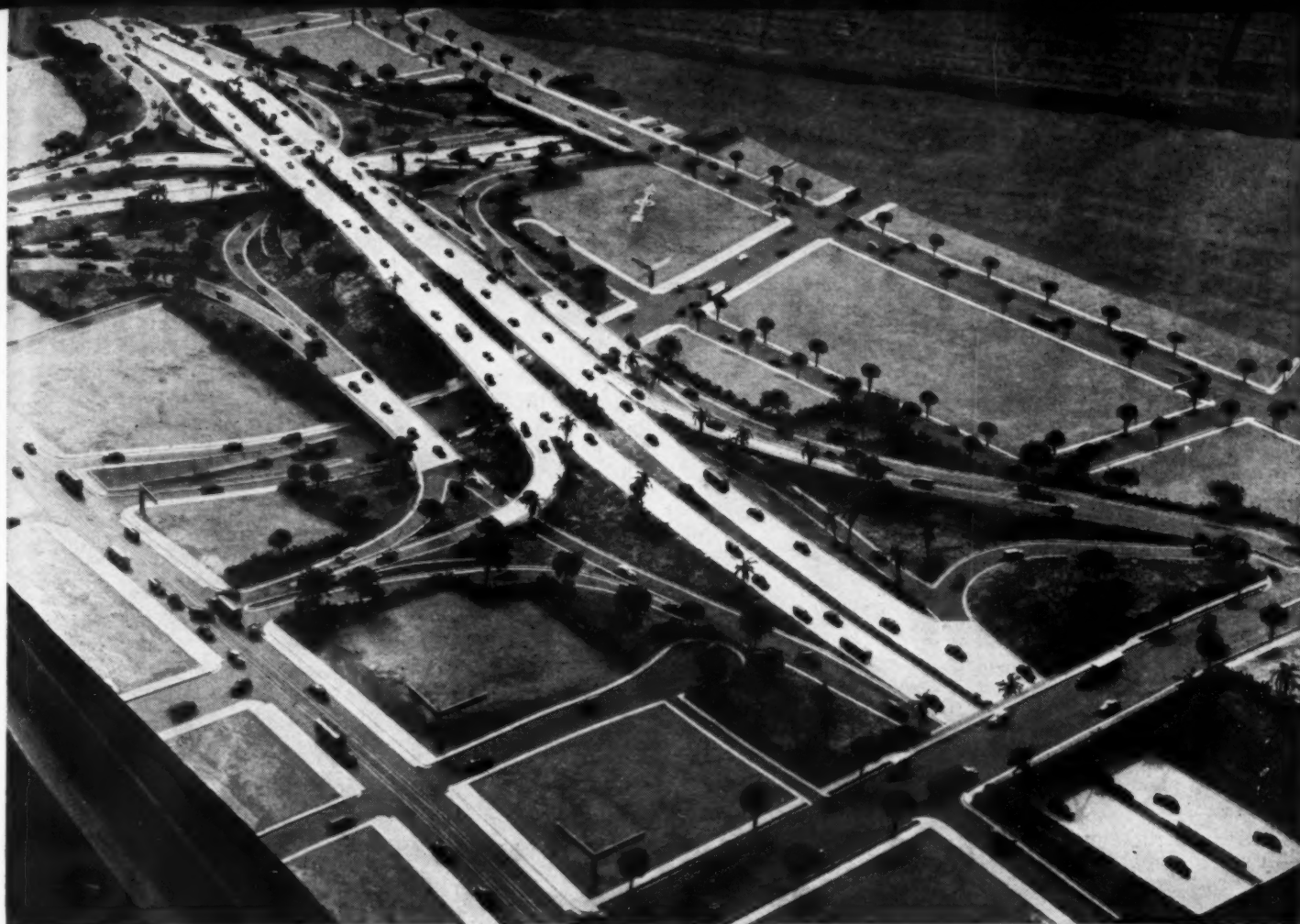
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★ Eight secondary structures will serve the main 4-level interchange bridge for Hollywood Freeway and Arroyo Seco Freeway in Los Angeles

Model Aids Super - Interchange Design

MODELS complete with landscaping have been used more and more frequently by the planners of expressway and other costly and complex urban highway facilities. It is now definitely established that displays of attractive models and photographic reproductions are a real help in "selling" the public on proposed improvements. Less often recognized is the value of models as an aid to design.

An example of a model which helped designers to visualize a complex interchange problem is that made for the intersection of Hollywood Freeway and Arroyo Seco Freeway at Los Angeles. This intersection represents one of the most important elements in the California Division of Highway's hundred-million-dollar freeway program for greater Los Angeles. It will be called upon to handle a

huge volume of traffic from the main N-S and E-W axes of the freeway system. Some 25% of vehicles approaching downtown Los Angeles in the mornings from the west will turn right from Hollywood into the Arroyo Seco-Santa Ana axis, and this pattern will be reversed in the evenings. Other directional changes will be made in large volume. Preliminary studies revealed that the usual cloverleaf would be inefficient, add greatly to travel distance, and require excessive right of way at very high land cost. More widely spread out types of junctions were even less feasible.

W. H. Irish, senior highway engineer, District 7, of the California division of highways, is credited for suggesting a 4-level structure, and such a design has been developed and detailed plans prepared by bridge engineer F. W.

Panhorst and staff. But not without some knotty problems, due to the grades, curvatures and alignments of the various roadways involved, and to the structural difficulty of providing support for the bridge decks without interfering with traffic flow at various levels.

(Continued on page 85)

★ How to locate columns without interfering with traffic at lower levels was one of the serious structural problems





Novel Driver and Puller

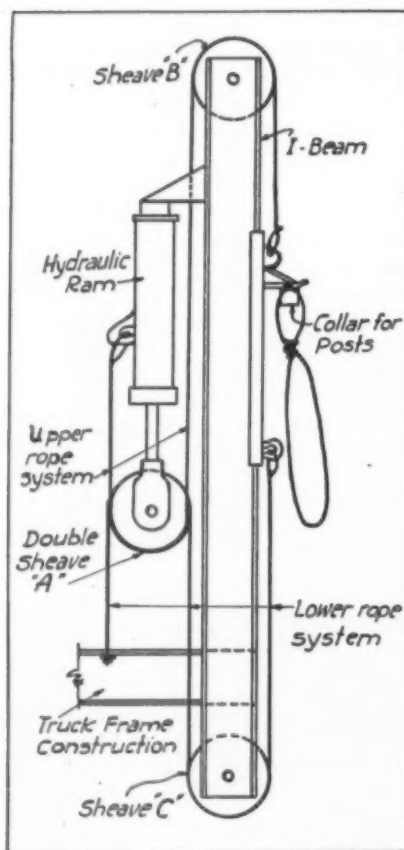
for snow fence posts
devised by this Iowa
county road department



vertical post, consisting of a section of I-beam bolted to the truck frame. On the end of the ram piston is a sheave (A). As the sheave is forced downward, a cable passes under it and up over another sheave (B) at the top of the post, correspondingly lifting an iron cap designed to fit over the top of a steel or wood post. A wire rope sling is used to pull the posts. The cap is part of a steel slide plate to which is also fastened another cable system passing over sheave (A) and under sheave (C) at the lower end of the post, thus enabling forcing of the post downward in driving.

The system is powered by the truck motor, via a power take-off unit and hydraulic pump. A separate cable leading back from the ram is used to pull snow fence up into the truck bed.

Mr. Robertson has about 40 miles of snow fence. Pulling and driving costs average about 2 cents a lineal foot of fence per season. Cerro Gordo County, in common with other road organizations, has had to make much old fence do until new is available. No new fence has been purchased since 1933, and the remarkably long service of the present stock of wood fence is due to good housekeeping, Mr. Robertson feels. Fence is not stored in the fields, as in the case with some other counties, but brought into the yard of the main county garage or one of the district yards and stored carefully in two large piles. The stored fence is supported well off the ground. Steel posts are also stockpiled with care.



THE maintenance men in several state and county road organizations have gotten tired of hand driving snow fence posts and done something about it. Latest such contraption to be observed in our travels is that devised by the shop men in Cerro Gordo County, Iowa, R. E. Robertson, county engineer. Mr. Robertson describes the outfit as a truck that hauls and pushes in posts, and also pulls the posts and loads the fence back on the truck. Both the fence loader and the post puller operate from a hydraulic ram having a cable hook-up as shown in the accompanying photo and sketch.

The device is quite ingenious in our opinion. An ordinary 4-in. ram unit is mounted vertically, ram downward, on one side of the truck, being located back of the cab in a position which insures distribution of pulling or pushing force over both front and rear wheels of the truck. The ram is anchored to a

★ Post puller and driver with County Engineer R. E. Robertson holding post in driving position to demonstrate operating principle

Hanging Fence Wire Prevents Rock Falls

OREGON state highway maintenance forces successfully stopped rock falls from a steep cut face of conglomerate and glacial drift by means of wire fencing. While this idea may not be entirely new, it is a novel one deserving of wider use than it has received.

As pictured, the cliff in question is about 150 ft. high and 200 ft. long. It is along the Columbia River Highway east of Portland, in Division One, of which W. C. Williams is district engineer. The material proved so stable during construction of the road that it was trimmed to a slope of only about one in six, or very nearly vertical. The slope remained stable enough, and there has never been any danger of heavy slides, but there soon developed the constant danger of falls of small individual stones.

In 1939 the maintenance forces decided to try the idea of enveloping the entire face with strips of wire fencing, each strip being allowed to hang from an anchorage at the top of the cliff. The theory was that the considerable weight

of each strip of wire would insure that it held snugly against the face of the cut, and would thus catch stones before they had a chance to fall more than a few inches or a few feet, controlling the fall into the ditch area, thus preventing bouncing into the road surface. The fact that stones could move at all was due to the existence of pockets or irregularities over the face of the cut, so that the wire could not be everywhere anchored in close contact with the surface.

Fence strips were lapped a couple of inches and wired together into a solid sheath.

In the seven years of service this installation has proved to be 100% successful. Quite a number of small dislodged stones (up to perhaps 6 in. diam.) have been caught in the mesh at various heights, but not enough to overstrain the wire. Very small stones, pebbles and dirt particles that do get through have not been a road hazard, and this solution has saved the costly alternative of cutting several thousand cubic yards out of the cliff.

Roadside Parks in Penna.

The governor of Pennsylvania has signed a bill making \$150,000 available for construction of roadside parks. The state highway department has plans for beginning the first of these at once, after some delay in acquiring necessary right of way. Areas of parks will range from three-quarters to 2½ acres.

(Continued from page 83)

Appearance considerations also had to be met.

The value of a scale model, hence, soon became apparent, and a model scaled 1 in. to 30 ft. was built by E. R. Bradt of the bridge department. Measuring 4½ x 7 ft. this model was fabricated from wood and plaster of paris and all details reproduced faithfully, including shrubbery and cars spaced to a normal traffic pattern. The model is said to have been particularly helpful in studying over-all appearance, working out refinements in topography and in planning landscaping as well as in adjusting structural details to fit functional requirements.

While estimated to cost \$2,800,000 to construct, the 4-level interchange and surrounding system (including 8 secondary structures) is expected to offer operating cost advantages due to saving in time and distance sufficient to quickly retire any excess cost over alternate designs.



★ You can't see the wire fence from a distance, but it's strung along this steep cut. Bushes have grown through it in the seven years since installing

★ Close-up showing the fencing. Note the few small stones which have slipped through since the last ditch clearing





Photo by Aero Service Corp., Philadelphia

★ Aerial view of completed overpass of Camden, N. J., traffic circle described in June "Roads and Streets"

★ View of overpass as seen approaching Camden on Route 38. Lights control direction of traffic flow in center lane which is always one way and in the direction which results in greatest relief of congestion



★ Specially designed light-reflecting curb of white cement, resilient guard rail, non-skid pavement, and restricted use are among safety features engineered into the project. Slopes are being sodded



Traffic Circle Overpass

In Operation at Camden, N. J.

NEW JERSEY State Highway Commissioner Spencer Miller, Jr., formally opened on July 12, the overpass over the Camden traffic circle. [Construction described June, 1946, "Roads and Streets."]

During the first four hours on the following Sunday, 8,350 cars used this facility. The overpass has proved so efficient in handling traffic that it has resulted in congestion at adjacent intersections which previously experienced no difficulty in handling all of the traffic fed to them by the Camden circle.

Pending delivery of lighting units and signs which have been on order many months, it is necessary to restrict the use of the overpass to daylight rush periods. New Jersey officials estimate that the new facility will reduce by more than 40% the previous weaving of cars at this junction.

The accompanying photographs were taken on August 1, at which time Francis A. Canuso & Son, of Philadelphia, were putting the finishing touches on this \$677,468 contract.

One of the interesting safety features of the project, noticeable in these pictures, is the curb on both sides which forms a vertical barrier. Inasmuch as the traffic is in one direction at one time and the opposite direction at another time, either curb must be alternately left-hand and right-hand reflecting. To provide this feature, the curb on both sides is built in 10-ft. sections which are alternately left-

hand and right-hand reflecting. A subsequent issue of "Roads and Streets" will feature an article telling of New Jersey's study and de-

velopment of light-reflecting curbs and median strips and how the safety principles evolved were applied to this structure.

Winter De-Icing Chemicals Have Job to Do

Stressing the need for early storage of winter rock salt requirements, Lloyd Reid, traffic engineer of Detroit and former Michigan state highway commissioner, pointed out that traffic volume is already 10% above previous highs *without any appreciable increase in the number of new cars on the roads*. When the new cars come, highway traffic will go still higher and the need for quick and complete snow and ice removal will be even greater than it is at present. To keep accident rates from soaring, cities, counties and states must have equipment and materials on hand to make roads safe in all kinds of weather for this growing volume of traffic. The only safe highway, he declared, is a bare pavement free of snow and ice.

Stating that it is cheaper and more effective to use rock salt alone for snow and ice removal than it is to mix it with sand or cinders, Mr. Reid pointed out that 200 lb. of rock salt is ordinarily mixed with every cubic yard of abrasives when they are stock piled and another 200 lb. per cubic yard is added just before they are used. Since 400 lb. of rock salt used without abrasives is the dosage recommended for complete snow removal on one mile of highway, commissioners who mix it are using as much as they would if they applied it straight and are spending money on abrasives, too.

In addition to these savings, straight rock salt cuts plowing costs by melting part of the snow and keeping the rest from freezing to the road surface, and the motorist gets bare highways instead of an abrasive-coated ice mat on which to drive.

Seattle Traffic Up 55%

Typifying a distinct trend throughout the United States, but possibly exceeding the average, traffic in Seattle has jumped to a volume far above the prewar peak. This fact is revealed in origin-and-destination studies being made jointly by state, city, county and federal highway agencies. Of particular interest is the 55 per cent increase in daily average traffic across the famous Lake Washington floating bridge and other bridges over Lake Washington Canal which divided the city.

This increase has taken place in less than two years, and 23 per cent of it since August, 1945. Traffic over the five bridges is now at an all time high of 146,000 vehicles daily. The traffic increase is due to wider use of present vehicles, rather than to increased registration to date.

(Continued from page 71)

necessary to continue the retreatment over an indefinite period of time and that it is unlikely that the pavement will finally reach a state where no additional retreatment is necessary.

This is the first year that the state has contracted for the retreatment of its roads, having previously done all of this work with state forces.

The state has four of the special mixing machines which are now rented to successful bidders.

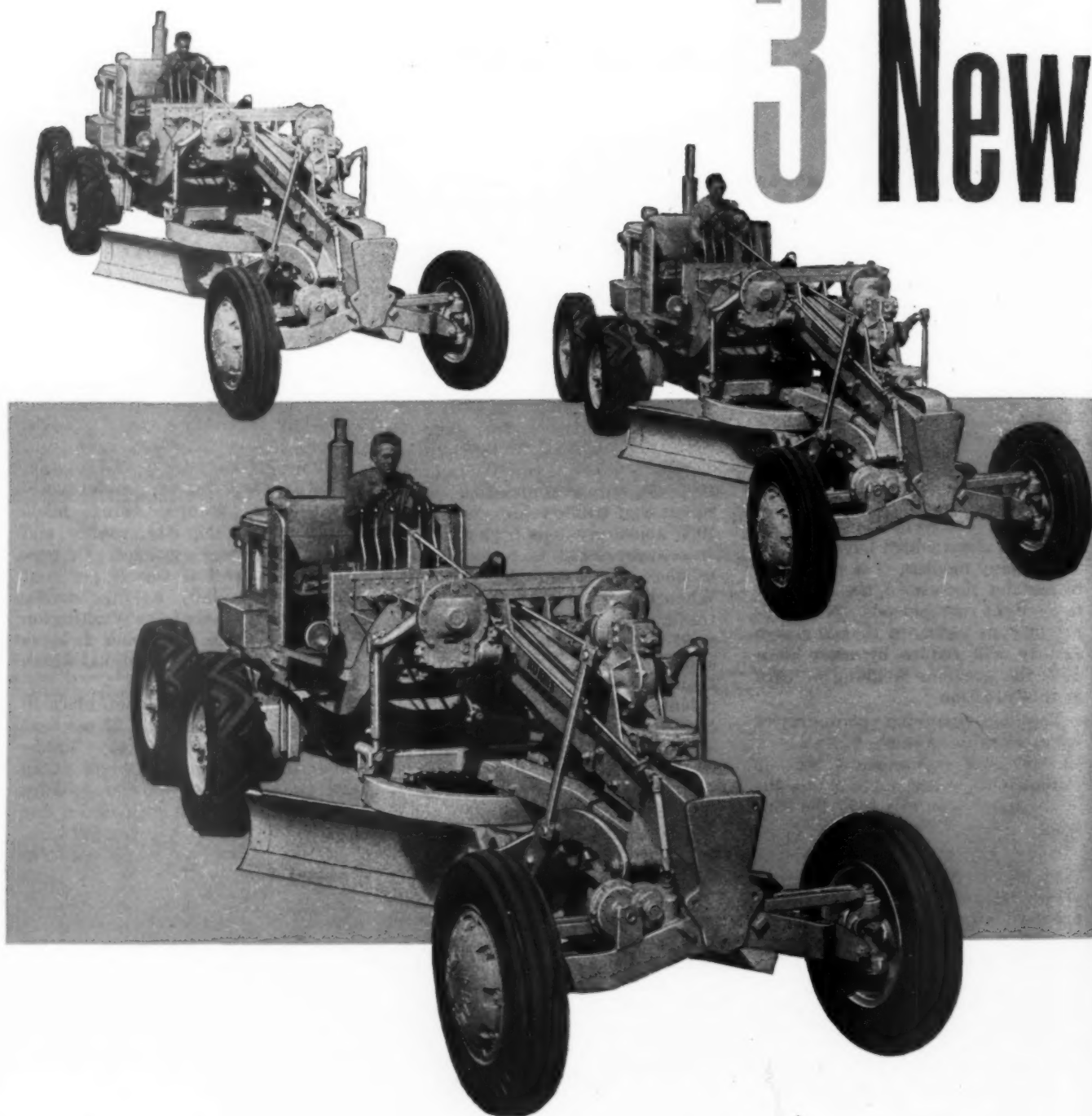
A 15-mile section of U. S. Highway No. 1, immediately north of Columbia, S. C., has received a 26-ft. width of retreatment. The retreatment in this case included not only the original pavement but also the stabilized shoulders.

Lower Scenes on Opposite Page

★ Easy-to-read and easy-to-understand signs are plentiful. Contractor was completing flexible pavement at time photograph was taken. Note his use of large-diameter rope for surface-course form and thickness gauge

★ Looking toward Camden from the Route 38 ramp, traffic on the circle is seen as well as the Admiral Wilson Boulevard approach and overpass

3 New



Adams is proud to announce three new post-war motor graders—all possessing outstanding features . . . *in design—in construction—in operating efficiency and economy.*

The new Adams Motor Graders are products of more than five years of intensive research and development effort. Among other important improvements, all three machines feature Adams' high-arch front axle, giving

Adams machines greater axle clearance than any other graders. Axle bulldozing is eliminated—larger windrows of earth and oil mix are moved—*better, faster, cheaper.*

These new machines are by far the finest in Adams' long history . . . *more powerful—more rugged—more economical to operate and maintain.* Ask your local dealer about Adams—*America's No. 1 Motor Graders.*

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ALL WITH HIGH-ARCH FRONT AXLE

No. 512—DELUXE HEAVY-DUTY MACHINE

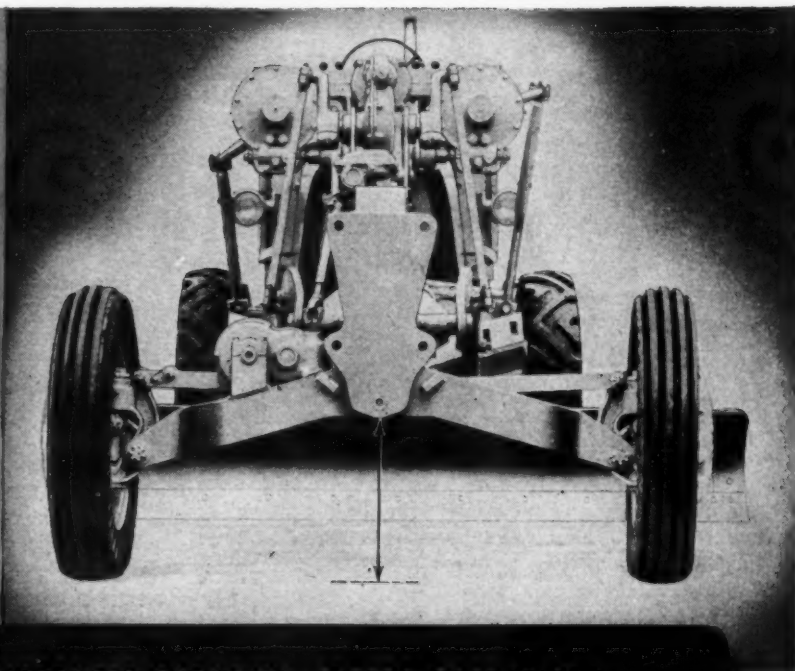
A large, rugged motor grader, possessing exceptional power and stamina. Machine is built extra strong throughout to stand up to continuous severe service under difficult operating conditions.

No. 414—HEAVY-DUTY MACHINE

This machine is equipped with same engine as the No. 512, but is not quite as heavy. Powerful and versatile, it is capable of handling all average surface, ditch and bank operations on a high production basis.

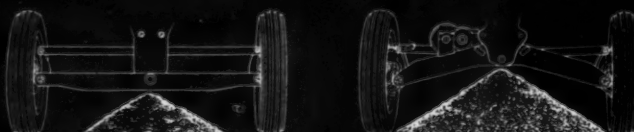
No. 312—MEDIUM-DUTY MACHINE

Economical to buy and operate, this machine has all blade positions of larger models. Widely used by cities, townships and counties for a wide variety of construction and maintenance work.



HIGH-ARCH FRONT AXLE INCREASES CAPACITY—SPEEDS OPERATIONS

The Adams high-arch front axle provides approximately twice the capacity of conventional axles for straddling large windrows of material, as illustrated by accompanying sketches. Thus, bulldozing of axle through material is eliminated—no waste of power, no loss of operating speed.

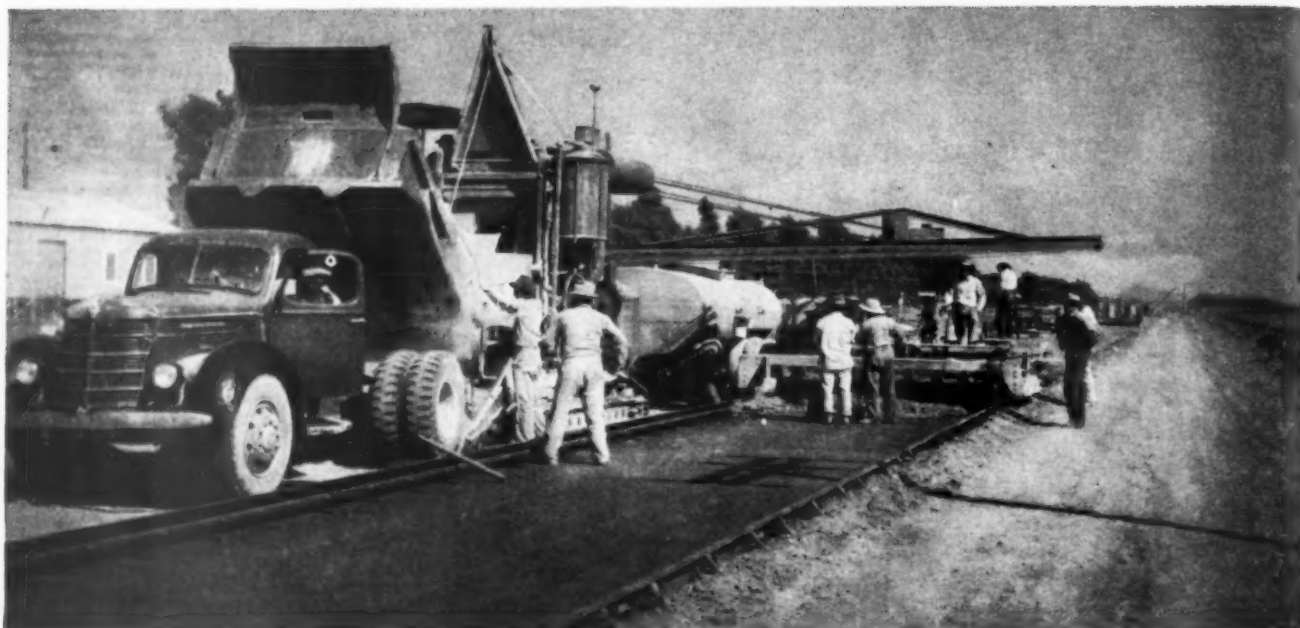


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★ Paver placing concrete on completed soil-cement subgrade. Note smoothness of grade and absence of expansion joints. This scene was snapped on the Basich Bros. project adjoining the similar project of N. M. Ball & Sons detailed in the accompanying article

California Builds Concrete Pavement with Soil-Cement Base

A COMBINATION of soil-cement base and portland cement concrete pavement was used this past summer on two adjoining sections of California's busy Coastal Highway between Los Angeles and San Diego. The improvement, broadly speaking, consisted of widening, resurfacing, strengthening and intermittently relocating 15 miles of this extremely heavily traveled route. Two contracts were awarded early in the year. That of N. M. Ball and Sons, for 9.5 miles from San Clemente to Las Flores Creek, was let in January and largely completed by mid-year. The following detailed account, bearing principally on the soil-cement phase, is confined to this contract.

A second contract immediately to the south of the Ball section was begun later in the year by Basich Brothers.

The major portion of the paving on the Ball section consisted of 8-in. portland cement concrete. About 51,000 sq. yd. of soil cement base 6 in. in thickness and 73,000 sq. yd., 4 in. in thickness were placed.

First major use of this combination specified for two contracts on US 101 totaling 14 miles. Following detailed report covers N. M. Ball and Sons' contract of 9.5 miles; 124,000 sq. yd. soil-cement base under 8-in. uniform slab provided to eliminate bad subgrade and meet extremely heavy traffic requirements

Notes on Concrete Pavement Construction

The 8 in. concrete pavement was placed in 11 or 12 ft. lanes. Where two adjacent lanes were placed, slabs were tied together with $\frac{5}{8}$ in. tie-bolt assemblies, 30 in. long and spaced 30 in. apart. No expansion joints were included in the pavement design. Transverse dummy joints $\frac{1}{4}$ by $1\frac{1}{4}$ in. deep were spaced every 15 ft. except for experimental sections.

There were two reasons for the development of this design. Evi-

dence of considerable faulting and some pumping at the joints on existing pavement along the project indicated to California highway engineers that some subgrade correction should be made. It was also necessary to increase the bearing value of the existing subgrade to fit California's requirements for concrete pavement.

The engineers considered that soil-cement base should prevent faulting, prevent possible pumping on susceptible sections, and increase subgrade bearing value to meet requirements.



★ (Left): Photo 1. Inner forms were of 2 x 6 wood, shimmed up with wood blocks and held against the existing pavement with steel stakes. (Right): Photo 2. Scarifying subgrade, first step in soil-cement processing

Preliminary Laboratory Tests

Samples of existing soil materials were taken at intervals along the project and tested by the state highway testing and research laboratory in Sacramento. A compilation of these test results is given on the accompanying table.

On the basis of these tests, specifications were drawn up stipulating that existing materials be road mixed. Tests showed that existing soil materials from about Sta. 200 to Sta. 30 had an unusually high percentage of fines passing No. 270. This fraction is largely in active clay. A comparison of the results of wetting and drying tests made upon samples 1226 and 1226A, after 12 alternate cycles, shows that blending 50% sand with the existing soil, reduced soil loss from 10.9% to 3.0%, reduced swell from 0.7% to 0.2% and increased the compressive strength of specimens, at the end of the test, from 295 psi. to 640 psi. It was decided that 50% sand should be blended with the soil between Stations 210 and 27



★ Photo 3. The traveling mixer making first of two dry passes

before processing.

Test results also would indicate very nearly 100% passing the 1-in. screen. Only three samples showed a small percentage of oversize stone retained in the 1-in. screen.

Concrete pavement forms were set out ahead of soil-cement base

construction, beginning at Sta. 469-63 on the west lane and leading south. Standard steel forms were used on the outside. For the side next to completed pavement, forms were 2x6-in. wood, shimmed up to pavement grade with wooden wedges and mortar (Photo 1). Steel stakes also pictured in Photo 1 were used to hold the inside headers down and to prevent sideslip. This method was adopted, since specifications did not permit drilling holes in adjacent pavement within 10 in. of the edge. These stakes increased the difficulty of keeping raw soil away from the edge during mixing and also create a problem in obtaining edge compaction. After pavement is placed such stakes are extremely difficult to remove.

Balancing Soil Materials

A mechanical subgrader traveling along the forms, trimmed the untreated subgrade to what the engineer considered the proper elevation (Photo 11). The first sec-



★ Photo 4. Note ruts left in the soft subgrade by the motor grader. This means of spreading was discontinued

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Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

Other new design details: Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

These are but a few of the reasons why the Blue Brute Hi-Up is setting a new high in truck mixer performance — and offering time-saving, trouble-free production of better concrete at lower cost.

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RS-7

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Pavers, Concrete Spreaders and Finishers*, Portable and Stationary Mixers, Pneumatic Placing Equipment, Truck Mixers, Plaster & Bituminous Mixers and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Contractors' Pumps* and Accessories.

*To be announced.



Truck Mixers
Capacities:
2, 3, 4½ cu. yds.



Portable Mixers
Capacities:
3½, 6, 11, 16, 28 cu. ft.



Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.



Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

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See ad on page (92) for list of
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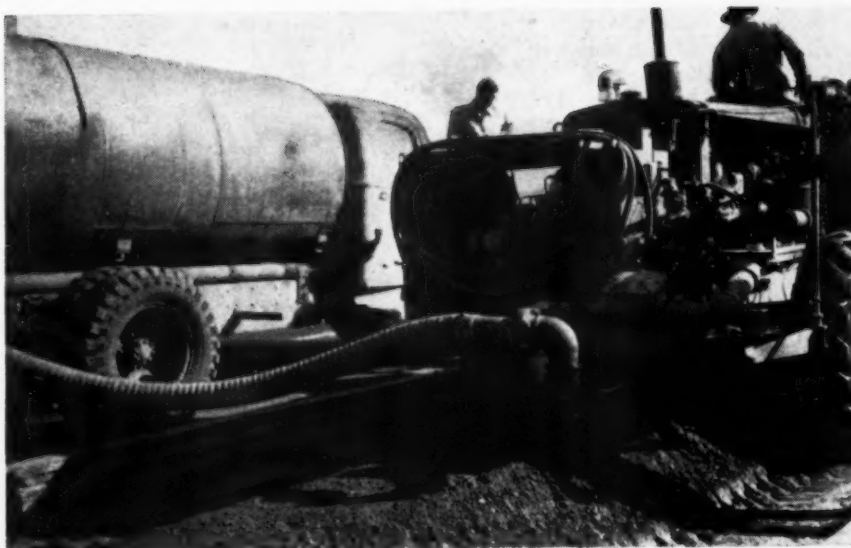
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Worthington Pump and Machinery Corp
Worthington-Ransome Construction
Equipment Division
Holyoke, Massachusetts



★ Photos 5 and 6. Travel plant taking on water and partially mixing

tions were trimmed about $\frac{1}{2}$ in. high. Later, in an effort to eliminate final cutting of the completed base, this was reduced to about .02 foot.

Scarifying for Soil-Cement

During the first two days scarifier teeth on a motor patrol were used to loosen the base material to the required depth. The patrol then pulled the loosened material into a windrow and the traveling mixer made a preliminary pulverization pass. On the third day this pass was eliminated and it was found that when two dry mixing passes were made after cement was added, no preliminary pulverization was necessary to meet the specified requirement that not less than 80% of the amount that can be washed through a No. 4 sieve pass that sieve.

A short length of $\frac{5}{8}$ -in. reinforcing steel was welded to the end of the patrol blade. This rod riding

on the top of the header guided blading depth.

Cement Content and Spread

The specified cement content was 4% by weight and the amount actually used was 5.47% by volume, except between Sta. 106+50 and 27+00, west lane, where 8.20% by volume was used.

No sand was used to blend with existing soil materials on that part of the west lane where there was excessive minus 270 material. However, as noted above, cement content was increased over a part of this section.

Various combinations were used in certain lanes and sections of the 9.5 miles project, summarized as follows:

(A) 8 in. uniform p.c. concrete with 4 in. of soil-cement having 4% cement by weight (5.47 by vol.).

(B) 8-in. asphaltic concrete with same base as above, used on some lane sections.

(C) 8 in. concrete on 6 in. S-C base, using existing soil with more than 40% passing No. 270, 4% cement.

(D) 8 in. concrete on 6 in. S-C base, with soil more than 40% passing No. 270, 6% cement by weight (8.20% by vol.).

(E) Same as (C) except that 50% sand blended with soil having over 40% passing No. 270.

(F) 8 in. asphaltic concrete with 6 in. S-C base, using existing soil when less than 40% passed No. 270, plus 4% cement.

A mechanical cement spreader was used at first but hand spreading was adopted due to the relatively low cement content and difficulty in handling this equipment in the confined area. Bagged cement was unloaded along the work.

Each bag was uniformly distributed in the center of the section of loosened material for a distance of five feet longitudinally. The motor patrol then pulled in the edges, forming a windrow as hand labor cleaned raw soil away from the edge (Photo 2).

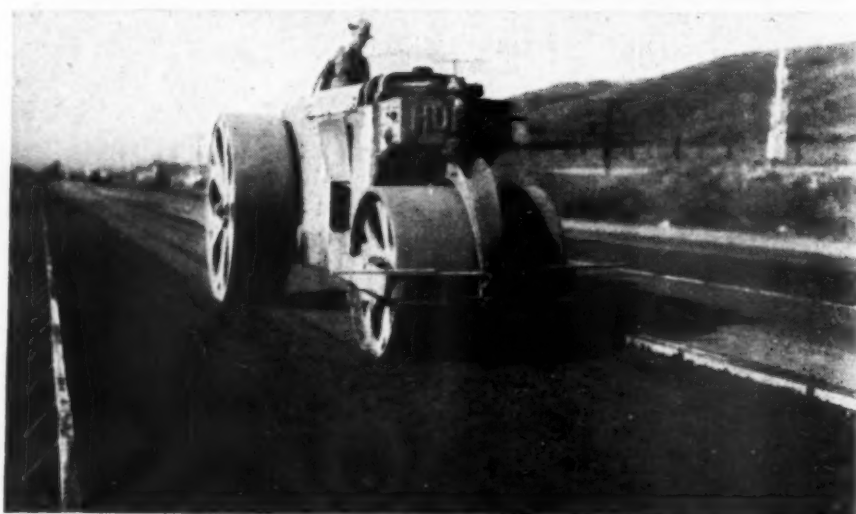
As the contractor desired to complete just about enough soil-cement base each day to take care of a day's paving, from 2300 to 2500 ft. of subgrade strip 11 ft. wide was processed daily. In order to limit operation time, two sections between 1000 and 1300 ft. in length were constructed each day.

Mixing Methods

Dry mixing of soil and cement was then performed with the traveling mixer making two dry passes (Photo 3). A fine uniform mix was obtained. Due to the confined working area and to traffic on the adjacent pavement, the mixer was forced to back through the lane to the starting point each time.



★ Photo 9. Compacting the soil-cement. Hand labor was required to clean loose soil-cement along inner edge, due to interference of the iron form stakes



★ (Upper): Photo 7. Drag-type spreader pulled by the travel plant on its last pass successfully spread the moist soil-cement mixture. (Lower): Photo 8. Showing the uniformity of spread from the drag spreader

Total water needed to bring the moisture content of the dry mixed soil-cement material to about $\frac{1}{2}\%$ to 1% above the optimum, was

added during one pass while accomplishing partial moist mixing (Photo 6). A second pass of the machine completed the moist mix.

Specifications required that not more than 30 minutes should elapse between the time water was first introduced into the mixture and moist mixing completed for the entire section. This time limit, often exceeded during the first days, subsequently became sufficient.

Spreading Mixed Windrow

Spreading the moist mixed windrow, following the last pass of the mixer, was accomplished with a motor patrol on the first few days' work (Photo 4). However this operation required considerable time and the patrol wheels were so grooved, by the confined working area, that it was impossible to avoid high ridges along the wheel tracks, with a low center, after compaction. Assisted by the engineers, the con-

tractor designed and built a drag-type spreader (Photo 7). This device, pulled by the mixer on its last moist mixing pass, rode along the headers on skids and utilized an adjustable inverted V nose so that even though the windrow might vary slightly as to size and position, a smooth uniform spread could be obtained. Thus the contractor was enabled to balance raw base material somewhat closer to final elevation and thereby reduce final trimming of the compacted base.

Another advantage resulted, in that the time loss between moist

mixing and compaction was greatly reduced as the roller could immediately follow the spreader.

Compaction was obtained with a 10 to 12-ton three-wheel steel roller (Photo 8). Immediately following the spreader, it produced a very smooth, uniform, tightly-knit surface. It seemed doubtful to some observers that a density equal to 95% of the maximum dry weight per cubic foot, as was specified, could be obtained in fine soil materials by means of such a roller. This difficulty seemed to exist even where base thickness was limited

to 4 in. Most density tests ranged between 90 and 93% with the average being 92.0%.*

At the start, density tests were taken in one of the two sections processed each day, usually at the center and at one or more quarter points. Later, tests were made every two or three days.

Final Shaping and Rolling

Immediately following compaction, a subgrader pulled by a motor

*These figures based on standard California compaction test methods.

Bids on U. S. 101 Southern California, Soil-Cement Base Project

Project: As described in foregoing article, job consisted of 9.5 miles of widening and partial reconstruction of existing highway to 4-lane standards. Located between Las Flores Creek and San Clemente, California. Project SN-U-FAP 136 — (13).

Date: Let Sept. 21, 1945.

Awarded to N. M. Ball & Sons, Los Angeles, Calif.

Bids itemized below submitted by:

(A) N. M. Ball & Co., Los Angeles — \$637,799.60.

(B) Matich Bros., Colton, Calif. — \$696,579.50.

(C) Basich Bros. Const. Co. & Basich Bros., Alhambra, Calif. — \$709,282.50.

(D) Griffith Co., Los Angeles — \$722,453.50.

(E) Peter Kiewit Sons' Co., Los Angeles — \$786,586.90.

(F) The Tanner Const. Co., Phoenix — \$791,634.30.

(G) Oswald Bros., Los Angeles — \$827,281.30.

(H) Ralph A. Bell, Monrovia, Calif. — \$836,489.00.

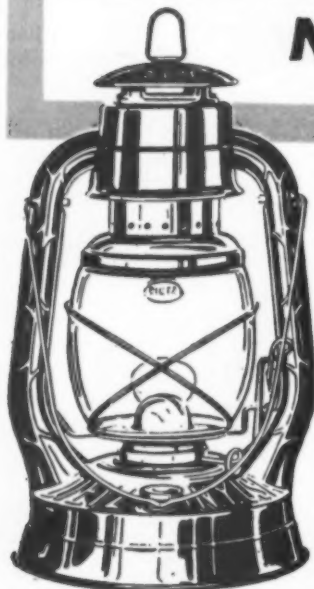
(I) Macco Const. Co., Clearwater, Calif. — \$889,810.00.

(J) J. E. Haddock Ltd., Pasadena — \$898,543.25.

Bid Item	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
65 cu. yd. removing concrete	\$ 8.00	\$ 12.00	\$ 5.00	\$ 8.00	\$ 23.30	\$ 15.00	\$ 5.00	\$ 8.00	\$ 10.00	\$ 16.50
Clearing and grubbing	7,500.00	6,000.00	3,000.00	7,000.00	1,560.00	9,000.00	4,000.00	12,500.00	5,000.00	30,000.00
176,000 cu. yd. roadway excavation	.39	.47	.45	.46	.49	.40	.32	.57	.60	.48
2,400 cu. yd. structure excavation	1.75	2.40	4.00	2.30	3.50	2.00	3.00	2.50	2.00	2.05
175 cu. yd. ditch & channel excavation	2.00	4.00	1.50	1.20	1.85	1.50	1.50	1.50	2.00	1.40
20,000 cu. yd. imported borrow	1.05	1.15	.65	1.10	1.70	.80	1.30	.85	1.00	1.30
4,610,000 sta. yd. overhaul	.005	.005	.005	.003	.003	.005	.006	.006	.01	.005
133,000 sq. yd. recompacting subgrade	.045	.06	.08	.035	.015	.03	.06	.06	.12	.10
51,000 sq. yd. cement treated base (6" thick)	.27	.32	.13	.20	.45	.65	.85	.40	.40	.30
73,000 sq. yd. cement treated base (4" thick)	.25	.25	.12	.18	.45	45.00	.57	.35	.30	.28
6,500 bbl. portland cement (cement treated base)	2.30	2.54	3.00	2.80	2.50	2.60	3.60	3.00	2.50	4.70
Dwlp. wir. sply. & furn'g wlg. eqpt.	1,750.00	7,500.00	3,000.00	10,500.00	12,352.00	1,000.00	20,000.00	20,000.00	5,000.00	35,000.00
5,500 M. gal. applying water	1.85	2.00	3.00	1.50	1.50	2.50	2.00	1.50	3.00	2.00
501 sta. finishing roadway	6.00	5.00	10.00	4.00	10.00	16.00	10.00	20.00	30.00	13.50
305 tons asphaltic emulsion (crg. sl. pt. bdr. & sl. g.)	23.00	30.00	30.00	35.00	20.50	30.00	50.00	30.00	23.00	41.00
800 tons liq. asph. MC-2 MC-3 or MC-4 (bit. surf. tr.)	16.00	14.00	14.00	15.00	14.45	15.00	13.00	17.00	16.00	15.00
99,000 sq. yd. preparing, mixg. & spreading surface (bit. surf. tr.)	.055	.10	.07	.08	.09	.07	.09	.10	.20	.08
31,500 tons asphalt concrete	4.85	4.90	4.80	5.40	5.30	5.00	5.30	4.25	6.00	5.80
325 lin. ft. raised bars	1.00	.50	.50	.50	.90	1.00	.60	.50	2.00	1.35
26,300 cu. yd. PCC (pavement)	8.85	9.25	10.00	10.50	11.10	12.00	11.00	13.00	12.00	12.00
2,000 ea. tie bolt assemblies	.85	.50	2.00	.60	.95	2.00	2.00	.50	1.00	.80
290 cu. yd. Cl. "A" PCC (structure)	31.00	30.00	85.00	41.00	52.60	40.00	36.00	50.00	60.00	80.00
32,000 lb. bar reinforcing steel	.055	.07	.08	.07	.09	.07	.06	.07	.08	.07
1,600 cu. yd. heavy stone riprap	4.20	7.00	7.50	8.50	7.00	9.00	14.00	6.50	6.00	7.00
95 cu. yd. Cl. "A" PCC (curbs)	25.00	28.00	25.00	25.00	64.60	35.00	40.00	26.00	60.00	72.00
1,000 ea. curb dowels	.20	.25	.30	.40	.70	.40	.15	.20	.25	.27
20 ea. monuments	3.50	5.00	5.00	5.00	6.10	6.00	5.00	7.00	5.00	10.00
930 lin. ft. metal plate guard railing	1.60	3.00	1.50	2.20	2.50	2.50	2.50	3.00	2.00	3.15
3,320 lin. ft. movg. & reconstructing guard railing	.80	2.00	4.00	1.50	2.20	2.50	2.00	1.60	1.00	2.20
115 ea. culv. mkr. project mkr. & guide posts	3.50	6.00	3.50	5.00	3.65	4.00	4.00	5.00	3.00	4.00
1.6 mi. removg. & reconstructing property fences	700.00	1,000.00	500.00	1,000.00	880.00	500.00	1,800.00	1,000.00	700.00	1,000.00
82 lin. ft. 8" CMP (16 gauge)	1.40	2.00	1.25	1.50	1.45	2.20	1.75	2.00	1.50	1.50
30 lin. ft. 12" CMP (16 gauge)	2.00	2.50	2.00	2.00	2.00	2.60	2.00	2.50	2.00	2.00
98 lin. ft. 18" CMP (16 gauge)	2.60	3.50	2.50	3.00	2.80	3.50	2.50	3.00	2.50	3.00
52 lin. ft. 18" CMP siphon (16 gauge)	3.50	4.50	3.50	4.00	5.10	6.50	3.85	6.00	3.00	4.45
66 lin. ft. 24" CMP (14 gauge)	4.00	5.00	3.75	4.50	4.25	6.00	3.85	5.00	3.50	4.25
26 lin. ft. 42" CMP (12 gauge)	7.75	11.00	8.00	10.00	8.40	10.00	8.50	10.50	7.50	9.35
110 lin. ft. 48" CMP (12 gauge)	10.00	12.00	9.00	11.00	10.00	12.00	8.50	12.50	8.50	11.00
5 ea. removing & resetting headwalls	25.00	25.00	100.00	30.00	40.00	150.00	20.00	50.00	20.00	30.00
5 ea. spillway assemblies	25.00	20.00	25.00	23.00	22.00	25.00	20.00	25.00	20.00	25.00
1,350 lin. ft. salvaging existing CMP culverts	.90	1.00	1.00	1.10	.60	1.00	1.00	1.30	1.00	.70
1,250 lin. ft. relaying salvaged CMP culverts	.90	1.00	1.00	.90	.60	.50	.50	1.30	1.00	.70
27 ea. salvaging spillway assemblies	10.00	10.00	5.00	6.00	2.50	5.00	15.00	27.00	10.00	7.00
27 ea. installing salvaged spillway assemblies	10.00	10.00	15.00	6.00	6.00	5.00	15.00	15.00	5.00	7.00
Engineer's offices	750.00	2,500.00	1,500.00	1,800.00	1,100.00	2,000.00	2,000.00	3,000.00	2,000.00	2,500.00

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over the world SAUERMAN Machines are making tough jobs easy, cutting costs wherever installed. One operator does the job! Speedy and powerful in every operation, with amazingly low operating costs, and long adaptable range. Simple, versatile, dependable. Write for catalog and see what these machines are doing on large and small construction jobs.

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Chicago 7, Illinois



Soil-Cement Construction Equipment List

- 1—Gardner traveling mixer
- 2—1200 gal. water tanks and trucks (1 detachable spray bar for fog shots)
- 1—Motor patrol
- 1—Huber 10 to 12-ton three-wheel steel roller
- 1—Multiple wheel, pneumatic tire roller
- 1—Lewis subgrader
- 1—Case pneumatic tired tractor
- 1—Bituminous distributor
- 1—Windrow spreader

patrol, trimmed the section (Photo 11).

Specifications allowed a tolerance of only .02 ft. below pavement grade. It was hoped that by using the windrow spreader, the section could be balanced out ahead sufficiently close so that final trimming could be eliminated. However, some cutting was necessary. Hand labor, following the spreader, removed oversize stone from the surface.

After final shaping the work section was given a fog shot of water (Photo 10), and rolled with a pneumatic-tired roller. Hand labor cleaned away any loose mix left against the adjacent slab edge, or steel header, after trimming.

An asphaltic emulsion curing seal was applied, .22 gal. per sq. yd. At the beginning of construction, the application of this seal was delayed until the following day. Later it was applied immediately after completion of the base on the same day, to permit concreting to follow the next day.

Soil-Cement Field Tests

The resident engineer, H. F. Caton was assisted by J. Beatty of the Sacramento Materials and Research Laboratory, in setting up soil-cement inspection and testing procedure. Shortly after construction began two inspectors were assigned to soil-cement processing, one to remain on the roadway checking cement spread, water addition, mixing, depth control and other construction features. The other inspector devoted his time principally to testing.

Representative samples of mixed material were taken from the windrow near the end of the moist mix. Specimens were molded from this material, according to the California method, and were forwarded to the Sacramento laboratory for

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G.T. Test No.	Station	Per Cent Passing						% Cem.	Compressive Strength p.s.i.			Lbs. Cu.Ft. Comp.	Wet and Dry 12 Cycles			Cpt. Moistu
		1"	#4	#30	#100	#200	#270		7-da.	14-da.	28-da.		Loss	Swell	Com.Str.	
1190	200	98	87	70	53	43	40	3 4 5	440 585 750	- - -	475 680 865	139 139 139	0.6%	0.2%	865	9.1%
1191	280	100	89	59	41	34	32	3 4 5	550 720 865	- - -	710 905 1055	145 145 145	0.5%	0.1%	1505	7.4%
1193	350	99	91	64	44	36	32	3 4 5	525 715 815	630 785 960	680 790 1090	143 143 143	0.5%	0.1%	1375	7.8%
1197	Fault Pit Sta.270	-	90	32	8	-	4	3 4 5	450 600 690	545 640 880	560 760 945	132 133 134	-	-	-	8.0%
1198	496	100	97	80	28	17	16	3 4 5	590 745 925	720 810 945	785 1025 1310	128 128 128	1.8%	0.0%	1175	9.7%
1226	50	100	100	91	68	58	55	6	-	-	970	128	10.9%	0.7%	295	10.7%
1228	30	100	97	62	23	18	17	4	-	-	870	132	2.7%	0.0%	735	9.0%
1226A																
50%	1226	-	95	61	38	-	29	'	-	-	770	134	3.0%	0.2%	640	8.6%
50%	1197															
1189	150	100	100	89	70	56	52	4	615	-	800	128	1.0%	0.4%	410	10.9%
1227	75	100	99	85	59	47	44	6	-	-	1095	130	18.2%	0.8%	410	10.3%
1229	100	100	98	91	73	61	55	6	-	-	950	130	9.4%	0.5%	375	10.6%
1230	125	100	98	84	56	44	42	6	-	-	990	132	7.5%	0.3%	520	8.5%
1231	165	99	95	86	65	50	45	6	-	-	1180	133	0.4%	0.2%	1095	9.4%

* Test results of samples of soil materials along the project

compressive strength tests. The compacted dry weight and the moisture content of these specimens were determined. Maximum compacted dry weight per cubic foot was then computed and used as a standard for field density tests, made at the same station from which the mixed material was taken.

Covered Bridges Still With Us

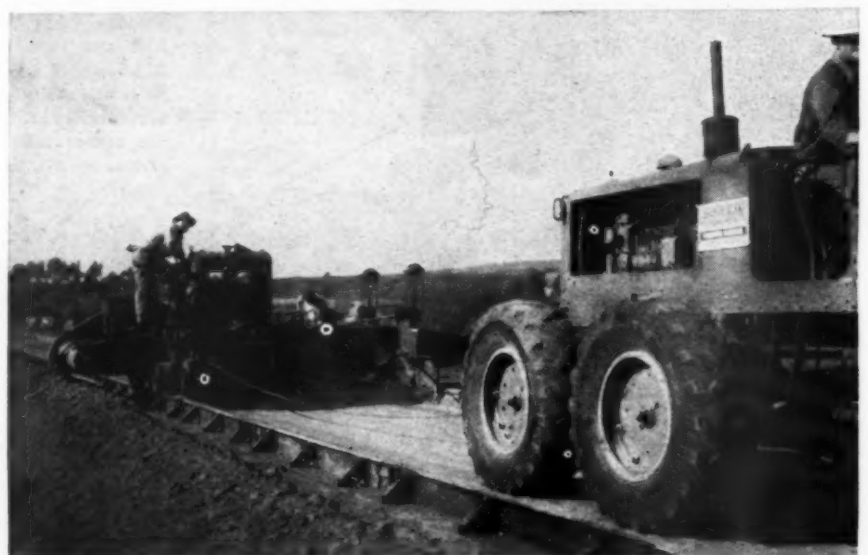
Covered bridges, just a memory? Hardly, according to a recent issue of "Highway Abstracts" of the Highway Research Board. Actually as compiled by the magazine *Outdoor Indiana* there are 183 such bridges left in Indiana, 591 in Ohio, over 250 in Pennsylvania and an estimated 300 in Oregon.

Of Indiana's aggregate of covered bridges, one is an aqueduct, two are on private property, two have been retired and preserved as relics, one is in use in a public park, one is on state institutional property, two on highways within state park areas and the other 185 are in use upon public roads, including a number inside the state highway system.

Indiana once had literally hundreds of covered bridges. The first was built in 1834. As far as is known, the last built was in 1922.



* Photo 10. Giving the soil-cement subgrade a fog shot of water after final shaping and preparatory to pneumatic rolling



* Photo 11. Following rolling, a subgrader pulled by a grader trimmed the section

"Practically no Oil Consumption at all!"



That's part of the Mack praise from Mr. Lyle of the **C. M. Lyle Construction Company.**

He further writes: "The Mack cab-over-engine design enables us to mount a road distributor on a wheelbase of 144 inches. This wheelbase length is very suitable for road distributor work, allowing for easier maneuvering, particularly in highway construction work."

Owner satisfaction is born on the drawing boards and assembly lines at Mack plants, where all the most modern features are designed into Macks side by side with long-life economy.

Get a well-constructed truck for your construction job. Why gamble? You can't miss with Mack!



This Mack has been working faithfully since 1941 for the C. M. Lyle Construction Company, Gainesville, Georgia.

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★ Is this fellow observing good safety rules?

Safety

in Road Building

73 specific suggestions or working rules for preventing accidents. How many are your men observing?

By L. W. Hagerup

Safety Engineer,
Lumbermen's Mutual Casualty Company,
Chicago

THE chief responsibility for accident prevention in road building definitely rests with management, as represented to the workers by the foreman. The workmen depend upon the foreman for proper instruction in all phases of their work, and safety is one of the most important. It should be the foreman's responsibility to become thoroughly acquainted with the latest safety devices and measures, to pass the information on to the employees and finally to insist that employees comply with his instructions.

Protective Personal Equipment

1. Wear goggles when chipping concrete or stone, dumping cement bags, operating power saws and doing all other jobs in which the eyes are exposed to danger.
2. Use an approved respirator when handling cement.
3. Wear good shoes with heavy soles to protect your feet. Safety shoes with hard toes are recommended.
4. Be careful of untied shoe laces or baggy trouser cuffs.
5. Wear heavy gloves when handling jagged, sharp or splintered

material.

6. To prevent burns from cement, use proper grease on exposed parts.

7. Drink plenty of water. In hot weather use salt tablets.

Cranes and Shovels

1. Inspect cables daily. The responsibility for the machine is the operator's.
2. Never start machine in action until oiler and pit man are within your range of vision.
3. Instruct the pit man always to stay in the operator's sight unless the operator is aware of his position.
4. Use special caution when loading trucks while drivers are on them. It is advisable for the drivers to get off trucks when they are being loaded.
5. When clam shell is used or material hoisted out of operator's vision, have an experienced man (generally the oiler) give signals. Only one man at a time should give signals to the operator.
6. See that slings are correctly spliced and inspected before use.

Machinery

1. Never grease or oil machinery in operation. Fly wheels, belts and open cogs should be guarded.
2. Never get on or off machinery in motion.
3. Never try to guide cables with

your hands or feet.

4. See that fans are guarded with a screen.

5. See that the impulse starter of magnetos on motors is in good order.

6. Lock portable compressors through the wheels or wedge them to hold in secure position.

7. Drain compressor tanks twice daily.

8. Pop compressor safety valves twice daily.

9. Keep power saws fully guarded at all times.

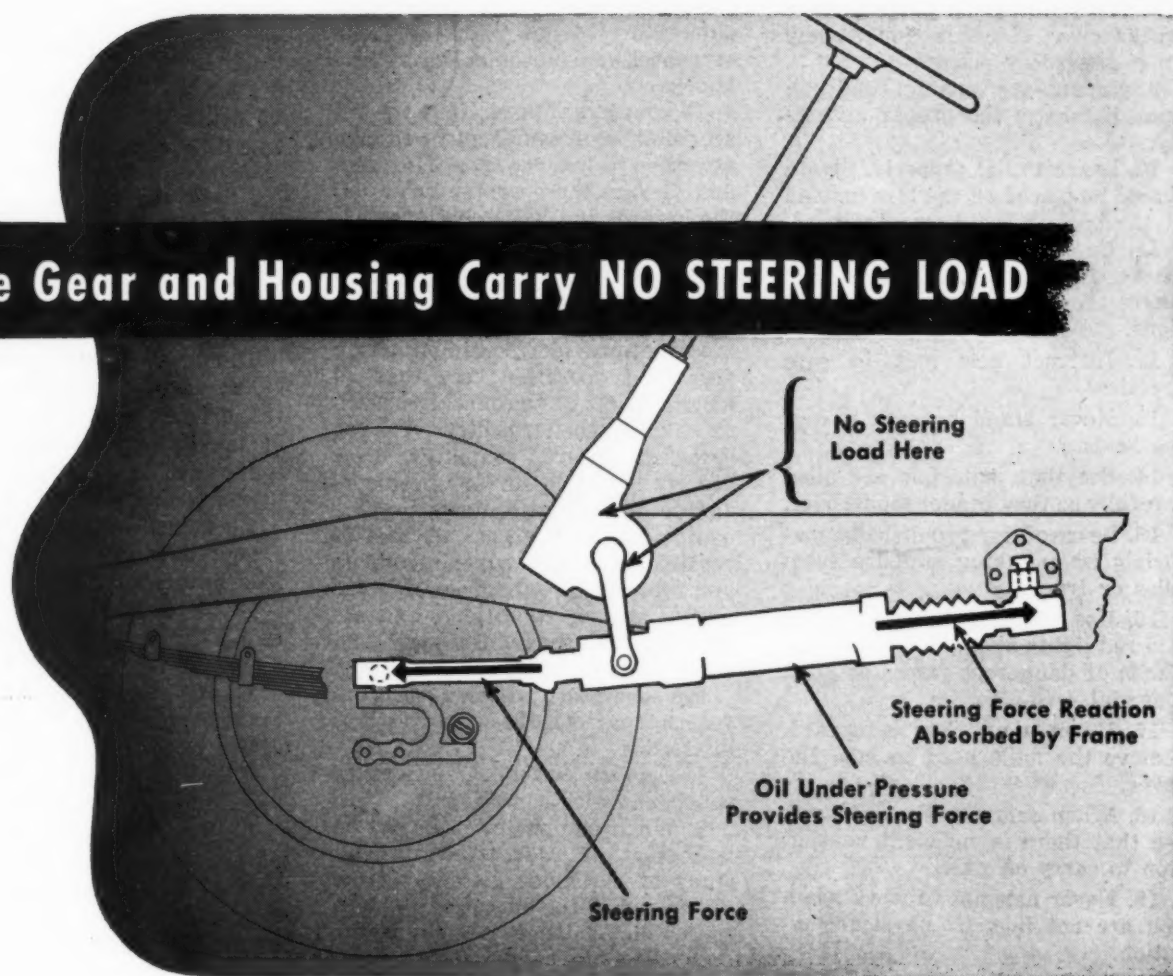
Proper Type of Tools

1. Use tools only for the purposes for which they were designed.
2. Never use a tool with a cracked handle. Wait until the handle has been replaced.
3. Never use mushroomed head chisels and ball points.
4. Always use sharp tools.

Other Hazards

1. Protect the public at all times.
2. Keep machines full guarded, especially power saws.
3. Remove protruding nails promptly.
4. Never carry sharp tools in pockets unless edges are protected.
5. Never indulge in horse play.
6. Be on the alert for stumbling hazards.
7. Post danger signs around high voltage lines or transformers.

The Gear and Housing Carry NO STEERING LOAD



With **VICKERS** HYDRAULIC POWER STEERING

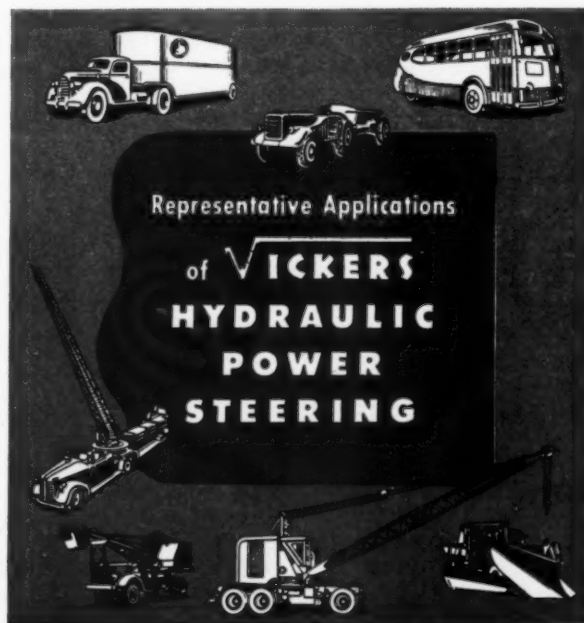
Neither steering load nor road shock can reach the steering gear and housing when Vickers Hydraulic Power Steering is used. All the steering load is carried by the hydraulic cylinder, and road shocks are transmitted to the frame. The Vickers booster unit is controlled by the pitman arm and actuates the drag link directly. Direct application of power assures protection against wear or failure in the steering gear proper—makes it possible to use a lighter, more economical gear and housing with complete safety.

There are many other advantages of effortless Vickers Hydraulic Power Steering. Ask for Bulletin 44-30 which contains complete information.

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101

8. Have watchmen posted where trucks cross sidewalk and at any other hazardous places.

9. Report any unsafe condition immediately to the proper authority.

10. Learn to lift properly. Strain should be placed on the legs instead of the back. Avoid overstrain.

11. Be sure lighting is adequate where footing is uncertain and where there are dangerous projections.

12. Instruct new men in safe practices.

13. Never stand beneath swinging loads.

14. See that materials are piled carefully so they cannot topple over.

15. Be careful not to dislodge materials when taking supplies from piles or trucks.

16. Use red flags in the daytime and red lights at night to warn the public of dangerous places or piled material.

17. When a nail keg is opened, remove the nails used to hold the cover.

18. When salamanders are used, see that there is sufficient ventilation to carry off gas.

19. Never attempt to work when you are not in good physical condition.

20. Don't use intoxicating liquors on the job.

21. Never allow children to play around road building.

22. Be on the alert at all times for danger signals and signs.

23. Make sure that the runways have smooth surfaces and are sufficiently wide to allow easy movement of wheelbarrows and buggies.

24. In case of injury by a fall, do not move the injured person until the extent of the injury has been determined.

25. Report all injuries, no matter how slight, for proper first aid treatment. Neglected injuries may result in serious infection.

Earth Movers

The hazards involved in operating road scrapers (earth movers) are great. Both management and employees must learn their responsibilities in order to prevent accidents involving this type of machinery. Among the hazards are the possibility that the operator may be struck by an overhead obstruction; shock and jarring from the machine; overturn of the machine; exposure of belts, pulleys, chains, sprockets, gears and cou-

plings; the danger of striking other objects or persons with the blade or shovel, and uncontrolled vehicle traffic.

To counteract these, it is the responsibility of management to give attention to job placement; instruct and be sure the operator knows all the hazards involved; check periodically the maintenance of the machine; provide seats or platforms and rail guards if possible to keep the operator from falling off the machine; provide good illumination for night operation; see that all moving parts of equipment exposed to contact (belts, pulleys, chains, sprockets, gears, couplings, etc.) are fully enclosed or protected against accidental contact; provide equipment with signal devices if possible; instruct superintendents and foremen to watch regularly for unsafe acts or conditions, and see that safe methods are used and safety orders enforced habitually.

For operators of road scrapers (earth movers) these suggestions are basic:

1. Operate machines at speed consistent with conditions.

2. When equipment is in use on a section of road, place barrier signs at sufficient distances from either end of the operation to warn the public of danger ahead. If the operations are sufficiently extensive, flagmen also should be stationed at strategic points. Where possible, detour all traffic around the job by another road.

3. Never turn road equipment at a curve or on the brow of a hill. Station flagmen on the road at both ends of the operation to warn approaching traffic.

4. Drive machines off the shoulder of a road only at slow speed. Some machines are so constructed that the sudden dropping of one wheel results in a violent tilting, and the driver may be thrown off the machine or against levers or wheels that may cause serious injury.

5. If possible, draw equipment entirely off the road at night. When any portion of the machine projects into the road or road shoulders, mark it adequately with red lights or flares.

6. Never jump on or off equipment while it is in motion.

7. Do not attempt to direct traffic while operating equipment.

8. Watch out for low limbs of trees or other overhead obstructions.

9. Wear suitable goggles when working where there are low hang-

ing branches of trees or shrubs and when sand or gravel is being worked.

10. Stop tractor, put shift lever in neutral and set brakes before any employee is allowed to couple up the trailing equipment. Throwing the clutch out and holding with the foot brake are not sufficient precautions.

11. Keep operating platform of scraper or grader free of material and debris at all times.

12. When you stop a motor grader, scraper or bulldozer and leave the driving seat, stop the engine or set the parking brake and leave the blades in cutting position, to prevent runaways.

13. Be careful that an elevator grader does not exceed the available head room.

14. Where elevating grader is filling trucks direct, see that the truck cab is not fouled by material or by the elevator mechanism. This caution applies to both grader operator and truck driver.

These precautions are the responsibility of highway flagmen:

1. Stand either on the shoulder of the road or in the barricaded lane at the edge of the open lane for traffic, near enough to men working to protect them, but in full view of approaching traffic.

2. In the daytime, use a red flag, at least 17 in. square, on a staff 4 ft. long.

3. To stop traffic, face approaching vehicles and hold the flag in the extended hand, so that the full area of the flag is visible below the staff. The length of the staff should permit the flagmen to stand clear in case a vehicle does not stop.

4. Do not wave the flag; hold it stationary in the horizontal position.

5. When signaling traffic to move ahead, lower the flag behind you and signal with the other hand, using a sweeping motion in the direction traffic is to move. Never use the flag to signal traffic to move ahead.

6. At Night, use a bright red light to stop traffic; swing it back and forth across the path of approaching vehicles.

7. Wear white or light clothing at night to enable approaching drivers to see you readily.

8. Place flares or warning lights about the working area to give traffic ample warning of the road conditions.

First Aid Suggestions on Road Jobs

The functions of first aid are to get the injured worker back on the job without delay; to prevent infection; to prevent further injury to a worker who has been hurt or who is ill; to prevent shock or further injury in getting to a doctor a person able to walk; to get a doctor to a badly injured person, and to keep the injured person in the best possible condition until the doctor arrives. It is necessary above all to know what to do and what not to do.

At least two persons on each shift should hold First Aid Training Certificates and be assigned to take care of all injured persons. At least one will be handy when needed. All injuries, slight or serious, must be reported to these men. The injured person should not dress his own wound or let any untrained worker do it.

Management has a duty to supply first aid facilities for the workers. How elaborate the setup is will depend on the size of the job and the number of workers. As a minimum, a well supplied first aid cabinet near a wash bowl is suggested. Any of the well known drug houses has a suitable cabinet. Suggestions for amounts and variety of supplies can be obtained from first aid handbooks or from your local doctor. Additional equipment might consist of a cot, two blankets, a stretcher, splints, electric plate, etc. *Caution:* First aid supplies tend to disappear, and are gone when most needed. Place the cabinet near the stock man, in an office, or where it can be watched.

Important phone numbers should be posted inside. The phone numbers of the doctor, the hospital, the nearest police and fire department stations and the residences of important company officials should be available at all times.

Records should be kept of all cases handled. Record forms should be simple, but complete. The first aider should follow up minor injuries to see that recovery is complete.

When to treat a wound, when to take the injured person to a doctor or the hospital and when to call the doctor or an ambulance are decisions the first aider must make. An injured person never should be sent unaccompanied to the first aid man. He may pass out and become more seriously injured.

There are only two real emergencies, in which the first aider

must act immediately. These are extensive bleeding and cessation of breathing. Here, immediate first aid is a life-and-death matter, and must go on while the doctor and ambulance are on the way. In the following other conditions, the doctor and ambulance must be called at once:

All very bad wounds; heart failure; shock; possible abdominal injury; head injury; extensive bleeding; extensive burns; neck, back, pelvis, leg or ankle injuries; Unconsciousness for an extended time; major amputations; internal poisoning; sunstroke; asphyxiation, edelectrocution or gas poisoning; apoplexy; all bad strains.

In these conditions, the patient can be taken to a doctor or a hospital:

All severe wounds or bad bleeding; all severe puncture wounds; minor amputations; fractures of the foot, arm, ribs, collarbone, jaw, etc. (watch out for shock); all infected wounds; all eye injuries; small localized burns; most strains,

sprains or dislocations.

For the following minor complaints, the first aid man may act, and send the patient to the doctor only if the condition has not responded by the next day:

Bumps; all minor cuts or other wounds; minor eye conditions; most minor punctures; small slivers; bruises; slight strains, sprains or dislocations; minor burns.

When treatment is given by the first aid man, a recheck should be made before quitting time and another at the start of the next working day. If the injury does not respond to this care by the next day, the patient should be sent at once to the doctor or a hospital.

The first aid man should not try to do the doctor's work. Prevention is the most important element in safe road work; proper care is next. This calls for training, skill and experience. The first aider does what is necessary for his fellow worker in an emergency, and should work in close cooperation with the local doctor.

New R-W Laws needed in many states

Abutting owners' vested interest, including right of access and commercial roadside rights, must be transferred to the public domain in order to prevent accident-breeding ribbon development. Condensed from a paper given before the Western Association of State Highway Officials, Salt Lake City, June 11, 1946

By J. M. Devers

Chief Counsel, Oregon State Highway Commission, Salem

THE matter of rights-of-way for highways — of minor importance in the beginning — is now one of the major problems of highway construction. Property costs and property damage add materially to per mile cost of highway construction.

During the last quarter of a century an apparent rivalry has developed between the road builder and the motor vehicle builder. Greater speed, increased comfort, more convenience, increased size and carrying capacity have been the ambition and the goal of builders of motor vehicles, thereby creating a constant demand for a type of

highway often beyond the financial ability of the states, but, nevertheless, a type and standard which highway engineers have struggled and still struggle to meet.

To some of the demands made by highway users, the highway builders and highway officials can say "no," such as, more weight, greater width, and increased size of load. But when it comes to meeting requirements with respect to safety, convenience, speed, and other time- and life-saving factors, the answer is not so easy. Early in road building in some of the states, and it was true in Oregon, the counties provided the rights of way. Limited finance forced the use of the rights of way which counties had acquired for county roads, and

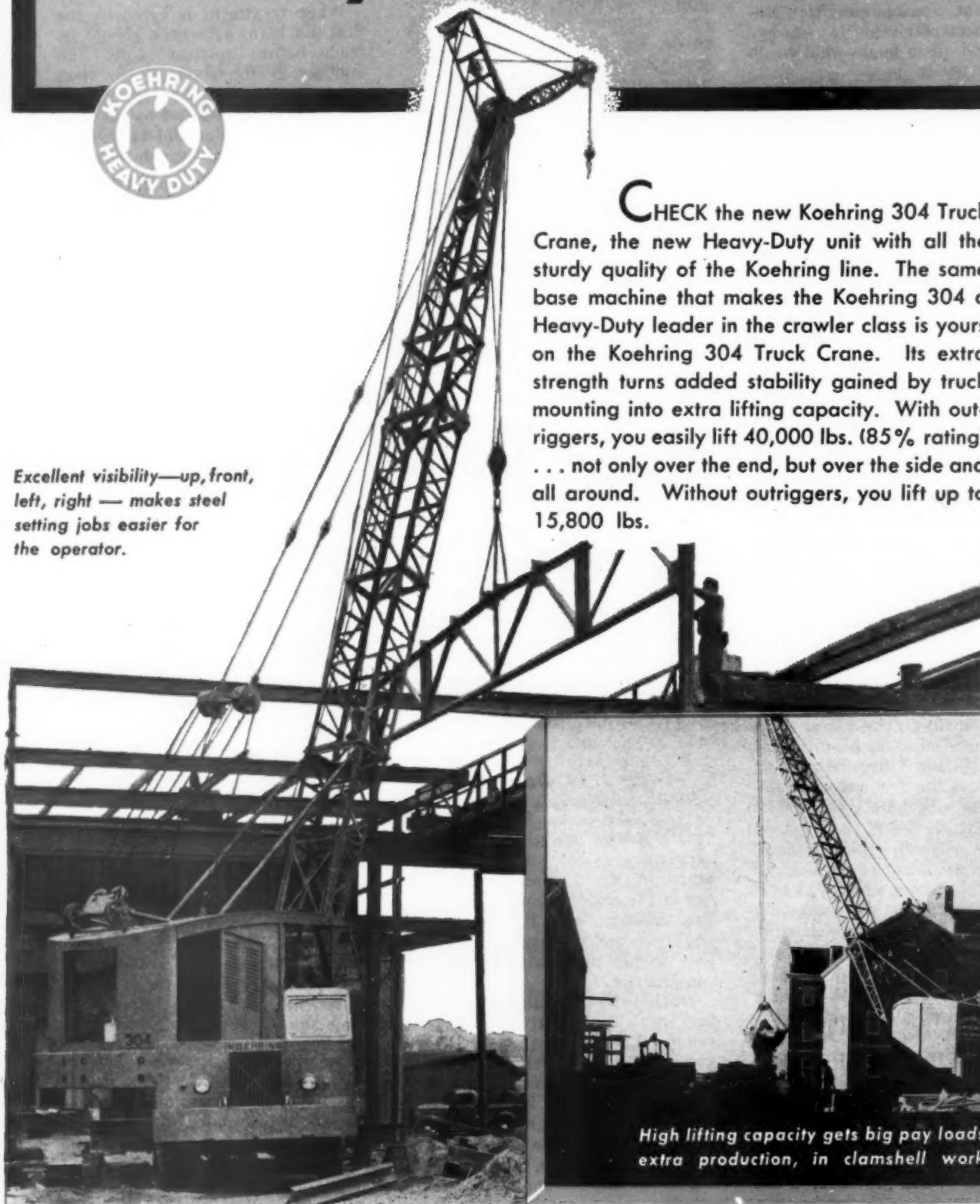
New KOEHRING

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Excellent visibility—up, front, left, right — makes steel setting jobs easier for the operator.

CHECK the new Koehring 304 Truck Crane, the new Heavy-Duty unit with all the sturdy quality of the Koehring line. The same base machine that makes the Koehring 304 a Heavy-Duty leader in the crawler class is yours on the Koehring 304 Truck Crane. Its extra strength turns added stability gained by truck mounting into extra lifting capacity. With outriggers, you easily lift 40,000 lbs. (85% rating) . . . not only over the end, but over the side and all around. Without outriggers, you lift up to 15,800 lbs.



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No-pay travel time drops to the minimum. You roll along from job to job as fast as traffic flows. Where trucks go, you go.

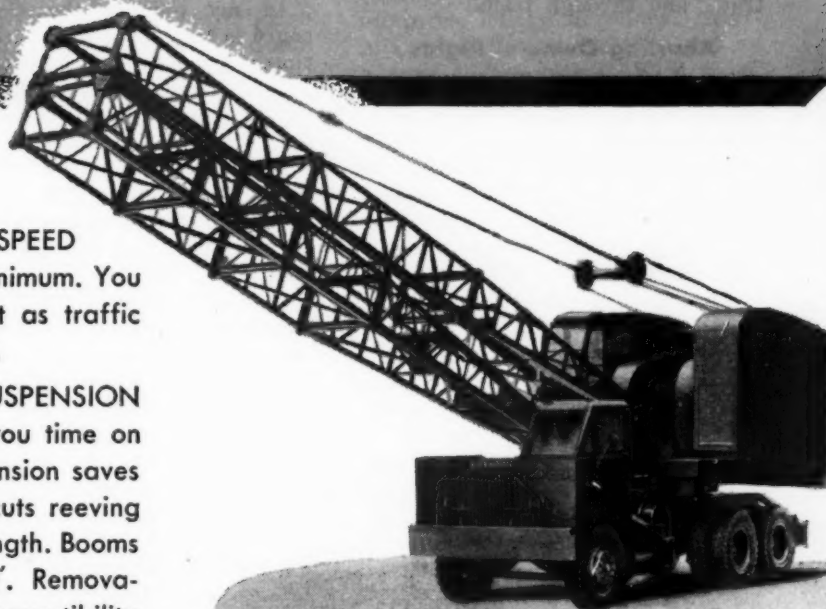
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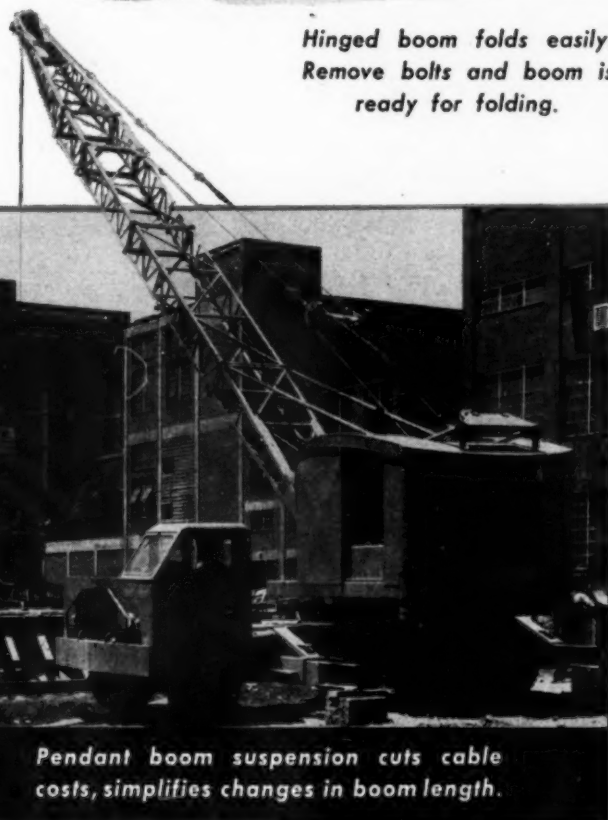
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when a county road was taken over as a state highway the state officials were limited to what the county had to offer.

Today rights of way and related controls are of equal if not greater importance than base, grade, drainage and curvature.

Known facts demonstrate conclusively the need of specific controls—controls which will be effective and which will recognize a distinction between the needs of purely local traffic and through traffic.

Abutting Owners' Rights

To make such controls possible the public must acquire more complete and more exclusive interest in properties dedicated for right of way purposes, and greater freedom in highway designing must be assured. Highway engineers and highway officials are now denied the right to design, construct, maintain and operate a type of highway which public welfare demands, merely because of property rights remaining in the abutting owner and withheld from the public.

This condition provokes a conflict of interests and circumscribes the action and judgment of the engineers and highway officials. What are these property rights which the abutting property owner retains? They are property interests and values which an owner of land abutting upon a highway has and which give him the right as against the public to get on and off a highway. These rights may be denominated "easements of access." They are incidents of ownership or occupancy of land. They are created the moment the public acquires a right of way and builds a highway thereon. These vested rights have been defined by a California court in these words:

Adverse Court Case

"It is also the settled law that: 'An abutting owner has two kinds of rights in a highway, a public right which he enjoys in common with all other citizens, and certain private rights which arise from his ownership of property contiguous to the highway, and which are not common to the public generally; . . . An abutting landowner on a public highway has a special right of easement and user in the public road for access purposes, and this is a property right which cannot be damaged or taken away from him without due compensation.'" (People v. Ricciardi, et al., 144 Pacific 2d 799, 803.)

The court then proceeded to enlarge on the rights of an abutting owner and held that such owner has a right of visibility of his property from the highway. The court said:

"The weight of authority seems to be in favor of the proposition that an abutting owner of property on a public highway has an easement of reasonable view of his property from the highway." (People v. Ricciardi, et al., 144 Pacific 2d 799, 806.)

In my opinion the California court is too sweeping in its definition and declaration of those rights. For a long time courts throughout the land have recognized an owner's right of access to and from a highway, but such courts have said that the right is subordinate to public convenience and they have further said that the right of access does not exist at all points where land abuts upon a highway but only at points which are consistent with public convenience and public safety. However, the major conflict between owner and the public is not so much with respect to ordinary ingress and egress. The real conflict is with the owner's contention and claimed right to have highway traffic leave the highway to become his patron and his customer, and then return again to the highway even to the inconvenience of and hazard to other highway users. As an illustration of the conflict which prevails with respect to ribbon development we may cite the instance of a four-lane highway constructed by the Oregon highway commission through territory which to a large extent was fields, gardens or pasture but which rapidly developed following the construction of a highway, with the result that of 10,000 motor vehicles which operate over the road during a given period about 400 find occasion to patronize activities along the highway to the detriment, inconvenience and, in some instances, hazard of the remaining 9,600 motor vehicle operators not interested in hot dog stands or other commercial use of that particular road.

New Authority Needed

An abutting owner's entire vested right in a public highway may for all purposes be transferred to and vested in the public pursuant to law and by the payment of just compensation. But to accomplish that result, it is necessary that highway officials be clothed with proper authority.

Vested with such power or authority, the only question or issue open for discussion between the property owner and public officials is the amount that the public is willing to or must pay for what the owner now has and the public needs.

We recognize that most of our highways and streets will for some time be utilized for local purposes — farm, home, factory, business and recreational — but gradually there is being pressed for consideration designed highways which will serve the needs and demands for through or arterial highways.

Public Interest Needs Spokesman

It would prove expensive were we to convert into a through or arterial highway one which now is in existence and which serves both local and through traffic. Modernization of highways must therefore apply largely to new or relocated highways. Several methods have been proposed for the accomplishment of control of access. These proposed methods include zoning, roadside development, land-use control and marginal land acquisition. In my opinion the simplest and most satisfactory method is a method by which the abutting owners' rights in the highway are all transferred to and vested in the public. We must concede, however, that the passage or enactment of through-highway legislation is dependent largely on public opinion, but a well-informed public can be depended upon to reach correct long-range decisions. Private interests and private property rights must yield to public welfare. The trouble, however, is that, when legislation is sought which has for its objective the welfare of the public, private interests unite to oppose, while few, if any, speak for the public, with the result that politicians listen to organized opposition and forget public interests.

Oregon is one of the states which has not yet adopted modern through-highway legislation, and until such legislation is on the books the interests of the private individual and the interests of local groups and communities will prevail as against the larger needs.

In Oregon private interests which at the last session of the legislature opposed through-highway legislation now indicate a change of heart. Roadside development groups, recreational groups,

motor court groups and other public organizations now offer to sponsor such legislation. It is our plan and purpose to prepare a bill covering the subject of through-ways, then confer with public organizations which are interested in the subject, and when their approval has been secured sell the plan to service clubs and Chambers of Commerce so that when the legislature convenes the measure will have sufficient support to insure its passage.

Why Costs Are High

Right of way costs will in any event prove expensive. These excessive costs are due to several conditions and developments:

1. Real property in every state has greatly advanced in price.
2. Areas through which through or arterial highways are located are usually highly developed and improved.
3. Through or arterial highways call for unusually wide rights of way.
4. Restrictions with respect to use and requirements by which easements of access are lost to the abutting owner make acquisition by agreement or by the exercise of eminent domain difficult and expensive.

A right of way buyer, who may be assigned the job of procuring necessary rights of way for the construction of a through or arterial highway, will find himself confronted with demands by the owner that compensation be made for these things:

1. Value of land taken;
2. Damage to land remaining;
3. Loss of right of access to the highway; and
4. Loss of right to have travelers patronize his commercial activities.

Transfer of Owner's Rights

However, if the kind of control which is necessary is to become possible, the abutting owner's interest in the highway must be completely taken from him and vested in the public.

Controls, under zoning legislation, roadside development, land-use controls and marginal land acquisition, all contribute and lend themselves to a highway design beneficial to the general public, but, unless the owner's easement of access is taken from the owner and vested in the public, the type of highway which traffic now demands will not be possible.

Booklets and Pamphlets Received

Every Policeman a Traffic Officer. A digest of an address by Jas. Kluchesky, Milwaukee chief of police, before the 2nd Annual Highway Traffic Conference of the Eno Foundation, Saugatuck, Conn. Facts on program that gave Milwaukee the lowest death rate from motor vehicles.

National Sand and Gravel Assn. Reports, representing reprints of papers from the recent annual conventions:

Annual Report of Director, Stanton Walker.

Ohio State Highway Department Practice in Use of Gravel in Bituminous Mixtures, by F. M. Wil-

liams.

Concrete Making Properties of Gravel from Southwestern U. S. (a laboratory investigation). Association Series 62.

Current Road Problems series, No. 13, "Use of Air Entraining Concrete in Pavements and Bridges"; issued by the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. Chapters of materials, cement vs. admixtures, design of mixes, ready-mix, construction practice, and an appendix of tentative ASTM specifications and tests and other data.

Pile Foundations and Structures. Manual of Engineering Practice No. 27, American Soc. of Civil Engineers. Prepared by the Joint Committee on Bearing Value of Pile Foundations; adopted January 1946. Price \$1.10 (50% discount to members) on order from ASCE headquarters, 33 W. 49th St., New York, N. Y.

In Days of Old Roads and Roadbuilding in Years Gone by



Photo by Courtesy Public Roads Administration

★ As recently as 1919, this is the way the main highway between Washington, D. C., and Richmond, Va., appeared after a rain. Today such scenes are only memory between large cities of the United States, but thousands of miles of paved roads interconnecting them are nevertheless obsolete. On many of our main highways rough, narrow, winding two-lane pavements still lead cross-country motorists through congested urban business districts. The Federal-aid inter-state system program will eliminate such bottlenecks all too slowly, and nationwide delay in such accident-preventing construction will mean blood on the hands of those responsible for postponement.

"The Protection of the Public Interests in Public Contracts", is the title of a book by Herman G. James, J.D., Ph.D., which is available through the Public Information Service, 1313 East 60th St., Chicago 37, Ill. The price is \$2.00. Written to help safeguard public funds in government purchases and sales, this volume has chapters on the classification of public contracts as to their objectives; general provisions in the public interest; competitive bidding; exceptions to requirements of competitive bidding; control over contract performance; etc.

"The Proportioning of Concrete," by A. T. Goldbeck, Engineering Director, National Crushed Stone Assn.; published as Tech. Information Bulletin 25 by the National Ready Mixed Concrete Association, Munsey Bldg., Washington 4, D. C., this is a paper given at the latter association's recent annual meeting; 14 pp. including table and valuable data. Free on request to above address.

Amer. Public Works Assn. The following revised Standard Specification bulletins have been issued by the *Amer. Public Works Assn.*, 1313 E. 60th St., Chicago 37, Ill. Price \$1.00 each: Standard Specifications for Sheet Asphalt (G1-46); ditto for Bituminous Macadam Pavement (G2-46); ditto for Asphaltic Concrete Pavement (G3-46); ditto for Cold Laid Asphaltic Concrete Pavement (G4-46).

Pennsylvania Equipping New Snow Fleet

Employees in the Pennsylvania Department of Highways are preparing for their annual battle to maintain traffic, Secretary Ray F. Smock reports. Hundreds of units of new equipment have been ordered for this work.

So far this year the department has purchased 246 new trucks, of which number 101 already have been delivered. Forty-nine of the new trucks on hand are the four-wheel drive type and 100 more are on order. These vehicles are to take the place of equipment in use during the war years when replacements could not be purchased.

The department also has purchased 532 new snow plows. Many of the new plows are for the purpose of replacing equipment badly used during the war while other

plowing units are for the larger new trucks.

Material shortages continue to plague the department in its efforts to prepare for the winter time maintenance work when approximately 10,000 miles of road will be kept free of snow and cindered. The department hoped also to purchase 2,000,000 ft. of new snow fence this summer. Manufacturers of snow fence have informed the department that the late situation is such that new fence is not being made. The department owns 12,937,000 ft. of snow fence from previous winters and this will be available for placing later in the year.

(Continued from page 75)

4.5% air entrainment, plus or minus 1.5% ingredients to be added at the paver. Four new 34-E dual drum pavers have been ordered. The contractor figures on production of about 2400 cu. yd. per day, which will be handled in either one or two shifts as circumstances necessitate. A single batch plant of conventional make-up will be employed, and the three sizes of coarse aggregates and the sand will be supplied from a commercial plant adjacent to the field.

Distributed reinforcement will be used — another instance where an ordinary supply item becomes a major field problem, due to the size of the job. The reinforcement, furnished by the federal government from war surplus, consists of No. 5 gauge mesh, 3 in. centers. Seventy-eight freight car loads of mesh is today stacked on the site.

Concrete with 3-in. max. aggregate size will be placed and struck off at a level 4 in. below the top of the slab, the mesh then placed, and the rest of the slab placed and finished using smaller aggregate, probably 1½-in. max.

Vibration Methods

One of the most controversial questions in the placement of very heavy pavement is that of vibration — whether to vibrate, and where and how. The engineers are considering various means of vibrating this job, and it is possible that a gang vibrator outfit, consisting of ordinary internal vibrator units mounted on a bridge, will be built, as was employed on a heavy runway in the West.

Acknowledgements

The runway was designed by,

and construction is supervised by the Cincinnati district of the U. S. Engineers. Full advantage is being taken of the data gained in the USED's test runway investigations at Lockbourne Army Air Base, Columbus, Ohio, where much study has been devoted to the problem of pavement and base design for runways in the 300,000 classification by the Ohio River Division Testing Laboratory.

W. L. Johnson Construction Company of Columbus has the general contract for the project, which will cost approximately four million dollars.

Airport Hearings Oct. 17 and 18

Hearings on proposed regulations governing use of government-owned land for airport purposes and reimbursement for damage done to public airports by federal agencies will be held here on October 17 and 18. Hearings on proposed rules and regulations for administering other phases of the Federal Airport Act will be held during the three days beginning October 14.

The text of the proposed rules and regulations has been published in the Federal Register, copies available from Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 15 cents. Texts of the other two parts will soon be published in the Register.

The hearings offer representatives of states, municipalities, and other political subdivisions, as well as interested private individuals, an opportunity to present their comments and recommendations.

Preliminary applications for federal aid under the Federal Airport Act will be received at CAA regional and district offices after October 1. Detailed applications can be made after the final text of the rules and regulations is announced about November 14.

New Laws to Aid Boston Parking Problem

City-built, privately operated facilities and underground garage make up program, according to an Automotive Safety Foundation report.

"Greater Boston Needs Action," headlined a recent printed bulletin widely distributed in the Hub City by the Greater Boston Development Committee, and it got action. The

state legislature has passed and the governor has signed enabling legislation which will enable Boston to make an all-out attack on the parking problem.

One measure permits the city to borrow \$5,000,000 outside its debt limit to acquire sites and construct off-street parking lots or garages for operation by the highest private enterprise bidders. Maximum parking fees will be determined by the city. Another bill authorizes the city to permit private operators to construct and operate a parking garage under Boston Common. Public funds would not be involved in this enterprise.

In urging those far-reaching steps the Greater Boston Development Committee declared, "Boston is recognized as one of the worst traffic snarls in the country. Nearly half of the present street areas are blocked by parked cars." Altogether, the Committee reported, Boston needs 6,700 off-street parking accommodations to adequately serve the six areas known as the retail, financial, market, government, shoe and clothing, and electrical and wool districts.

The parking program will serve those areas and will be integrated with the projected express highway known as Central Artery which will cut directly through or near most of the principal traffic destinations. The Central Artery is expected to relieve existing streets of more than 50,000 vehicles daily. That modern non-stop highway plus the planned adjacent parking facilities would entirely eliminate large volumes of traffic and parked cars now cluttering downtown streets.

Parking Meters on State Urban Routes

Plans for installation of parking meters on city streets being maintained by the Kentucky state highway department as part of the state systems must first be submitted to the department for approval, announces T. H. Cutler, chief engineer. Some municipalities have not observed state parking regulations, and this ruling is necessary according to Mr. Cutler in the interest of good state-wide traffic regulation. Where municipalities fail to comply with a department request for correcting a parking or meter situation, it can be considered a violation of the state maintenance contract and cause for discontinuing state maintenance of the route.

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How To Select The Right Bearing Lubricant

Helpful information on the correct bearing lubricant brought to you through E. F. Houghton & Co.

Type of Bearing

THE general types of bearings which are normally used in construction and maintenance machinery include either the plain bearing or the anti-friction type, such as the ball, roller and needle bearing. Each type of bearing, with its different design and construction features, has its own physical operating and frictional characteristics. Consequently, it will be found that each type of bearing theoretically requires a lubricant with certain definite physical properties.

The construction, design, and application of the bearing invariably governs the method of lubricant application. A study of the influence of the other factors prior to making a lubricant recommendation was important; where a lubricant was satisfactory for a certain type of bearing under one set of conditions, it might prove inefficient in the same bearing when operating conditions are different.

In selecting a grease for the various types of bearings, attention should be given to the nature of the physical characteristics. In other words, it must be known whether a grease of a fibrous or non-fibrous nature is required; or a grease that is characterized by its adhesiveness; or whether a soft or hard grease is preferable. These are but a few of the demands placed upon the physical characteristics of a bearing grease in service.

Bearing Size and Finish

Due to the multiplicity of bearing sizes used in industrial machin-

ery, the selection of the proper lubricant for any type of bearing appears to be a difficult task. However, certain facts have been established which tend to simplify the selection of the grease for the bearing in question. A relationship exists between the viscosity of base oil and the consistency of the grease used to lubricate bearing surfaces. The larger the bearing surface, the greater the area over which the oil-soap film must be dispersed, and the more difficult it will be to maintain an unbroken film. Then, too, the larger the bearing, all other factors being equal, the heavier the base oil and the more solid the grease. Greases for small industrial bearings are, in general, composed of light oils and are usually light in consistency.

Surface finish plays an important part in safe lubrication of increased unit pressure introduced by "high spots." These surface imperfections

can be responsible for many lubricant problems.

Clearances

In the use of a plain bearing, attention is given to the amount of clearance between the spindle and the bearing, as the clearance will affect the recommendation of the grease to use.

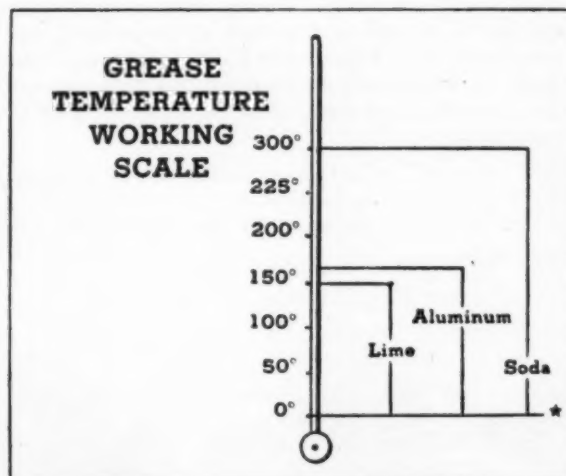
Where speeds are high and clearances are low, care must be taken that the grease used is made of light base oils and comparatively small percentages of soap.

In worn bearings or in large slow speed units, greases of heavier consistency and higher viscosity base oils are necessary to cushion possible shock loads, prevent leakage of lubricant and provide an adequate lubricating film.

Operating Speeds

One of the factors which influence the selection of the proper

★ Low temperature characteristics of greases are usually determined by the viscosity and cold test of the base oil as well as manufacturing methods



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Cable-Controlled Road Machine

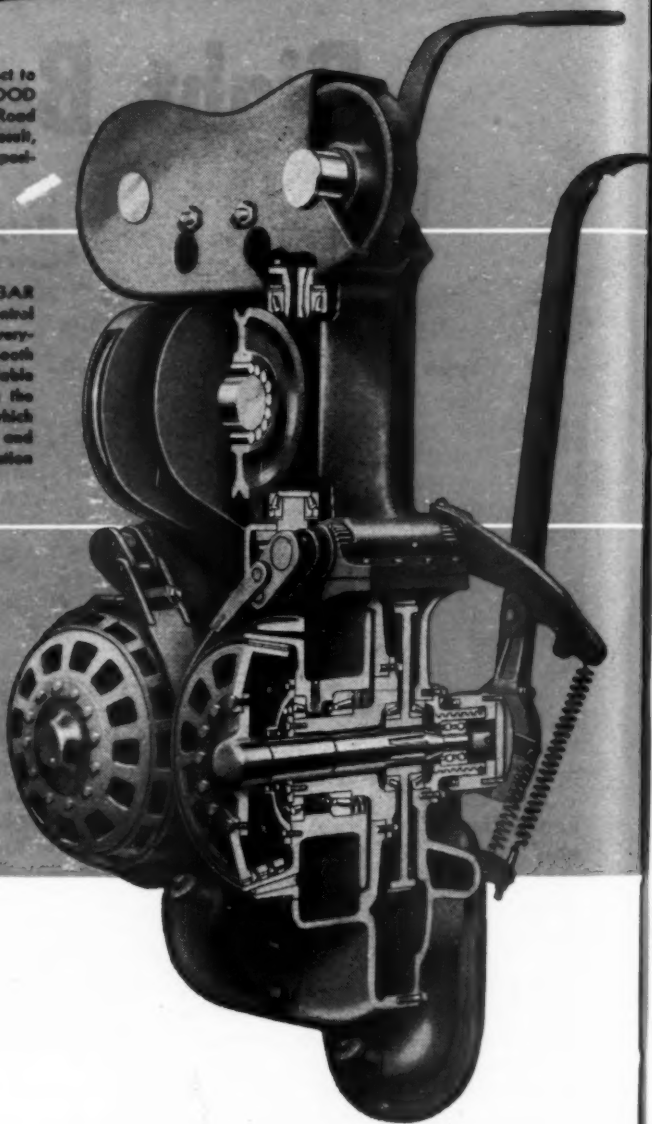
GAR WOOD Cable Controls Feature Rugged Simplicity and Direct Action Pull

The cable goes direct to the job in GAR WOOD Cable-Controlled Road Machinery. As a result, it has fast action, positively controlled.



Heavy-Duty Cable Ripper

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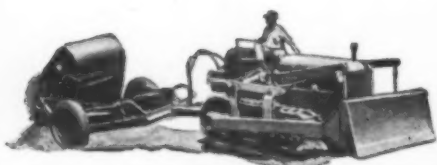
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grease for a specific bearing application is bearing speed. At low speeds and pressures the difference between greases of various textures, compositions, and consistencies is not too apparent. However, for such low speed applications the use of grease composed of heavier oils does have advantages over greases composed of lighter viscosity oils. Where similar bearings are operated at higher speeds, greater consideration must be given to the lubricant's texture, consistency, type of soap and oil which compose the finished product.

Greases of long fibre are not suitable for bearings operating at high speeds. This is important, as a grease of too light a consistency will not resist centrifugal forces and is apt to be excessively worked and eventually completely disintegrated. The "life expectancy" of a bearing under such conditions is adversely affected and can lead to unexpected mechanical failures and lost machine time.

The type of soap used in the compounding of the grease for an anti-friction bearing also is important as related to the operating speeds. Greases can be made from the various soap bases which will lubricate plain bearings operating at high speeds. Soda base greases compounded with light viscosity oils are usually used for the lubrication of high speed anti-friction bearings. This is necessary because of the ability of soda base greases to "channel," leaving the balls or rollers free to rotate, and bleed enough oil to provide lubrication.

Bearing Loads and Stresses

Although bearings and bearing surfaces in construction and maintenance equipment are designed to withstand average pressures encountered in their normal operation, occasions arise when this equipment is forced to operate beyond its rated capacity and speed for indefinite periods. Under such conditions, bearings may be required to withstand greater stresses and shock loads. Consequently, where equipment is to be used in applications of this nature, greater consideration must be given to the selection and recommendation of the proper type of grease. Here, too, the texture, consistency, type of soap and base oil are important.

Where equipment is constantly subjected to shock loads and high unit pressures, lubricants which possess greater film strength, cohesiveness and adhesiveness should

be used. In applications of this nature, more frequent attention is required in order that a constant supply of lubricant is assured.

Where vibration is a factor the separation of the base oil from its soap component in service must be considered. Constant bleeding or oil separation will eventually leave a mass of dry residual soap and result in bearing failure. This factor is dependent upon the compatibility of the oil and soap, and the methods used in its manufacture.

Atmospheric Conditions

Other factors to be considered are the ultimate use of the equipment and the atmospheric conditions under which it is to operate. When equipment must operate where it is constantly subjected to the influences of dust, moisture, corrosive fumes and liquids, its normal "life expectancy" may be greatly shortened. Consequently, steps taken to counteract the effects of these conditions are of measurable value to the user.

There is no mechanical limitation as to how far a mechanic can go to prevent the above influences from disturbing the normal "life expectancy" of his equipment. His only real limitation is cost. Where cost of mechanical limitations make it impossible to protect bearings from the effects of these influences, greater consideration must be given to the selection of the proper type of grease. Here, too, the texture, consistency and type of oil and soap used are important.

One form of protection for a bearing against the possible entry of dirt, dust or other forms of abrasive materials is more frequent lubrication. Precautions should be taken during the storage and handling of the lubricant to prevent its contamination. Where the presence of corrosive fumes and liquids is unavoidable, bearings can be given greater protection and better lubrication if attention is given to the solubility of the various soaps in those mediums. The use of a thick film of viscous grease on the outer surface of the bearing or at such points where these fumes or liquids are apt to enter has in many cases lengthened the life of equipment. Brick grease seals can be utilized in some cases. Frequent application of lubricant is also advisable under above conditions.

Where water or high relative humidity is a factor the selection of the proper type of lubricant to use is not difficult. Plain soda base

greases are to be avoided because of their tendency to readily emulsify. In some cases it is possible to use soda base greases in the presence of water when the lubricant has been made from heavy mineral oil. Here less soap is used to obtain a definite consistency and the heavy mineral oil "masks" the effects of the water on the soluble soap. Lime and aluminum base greases are more resistant to water than are soda base greases, and are therefore usually used where moisture conditions exist.

Operating Temperature Range

In considering a grease for an application a study should be made of the temperature range under which that lubricant must function. Consideration of only one limit or temperature is not sufficient. Although greases can be made to withstand the effects of a definite temperature, their operating characteristics throughout the rest of the temperature range under which they must function may be of such a nature as to introduce other problems.

The temperatures listed above as maximum for the various greases represent safe working limits and not melting points. Authorities agree that the safe service limits for these greases are as above indicated.

The constant operation of bearings at either high or low temperatures or throughout a definite temperature range imposes certain restrictions on the lubricant and its physical characteristics. In general, the type of soap used in present commercially available greases plays an important role in establishing the temperature limits under which they can be used.

Type and general physical characteristics of base oils also govern the temperature at which the grease can be used. The above chart, which is a general summary of temperature working ranges of various types of greases is offered as a guide in making the proper selections.

39 States Concur on Interstate System

Thirty-nine States and the District of Columbia have accepted without reservation the integration by the Public Roads Administration of routes proposed by the States to form the national interstate high-

way system, Commissioner Thomas H. MacDonald has announced.

Of the nine remaining States, four desire alteration of the integrated system proposed. Two of these states accepted a portion of the routes included in the tentative integration but rejected certain sections without alternative proposal. Another state followed the same course except that additional mileage was proposed. One state accepted the proposed system in entirety but requested inclusion of additional routes.

Five states have not as yet responded to Public Roads' recommendations, but the prospect of early agreement with most of the nine states "is not discouraging," Commissioner MacDonald said.

Development of a 40,000-mile interstate highway system was authorized by the Federal-aid Highway Act of 1944, and the states were asked last year to recommend routes for inclusion in the system. The total length of routes selected by state highway departments was 45,074 miles, which included some duplicate mileage and more than 2,000 miles of circumferential and distributing routes in large urban areas.

After reviewing the initial route selections recommended by the states, which in some instances involved disagreement between adjoining states concerning connections at state boundaries or the proposal of alternate routes within a state, Public Roads offered a tentative integration of the system.

All circumferential and distributing routes in urban areas were omitted from the tentative integration presented for state consideration. The main routes between and across cities which are included in the interstate system as recommended by Public Roads include

37,170 miles. This leaves a balance of 2,830 miles within the 40,000-mile statutory limitation, which is considered a sufficient reserve for the later selection of circumferential and distribution routes, Commissioner MacDonald said.

The Federal-aid Highway Act of 1944 did not authorize a specific appropriation for the development of an interstate highway system, but provided for an annual appropriation of \$225,000,000 in each of three fiscal years for improvements on the Federal-aid system and

\$125,000,000 for highway projects on the system in urban areas. Since the interstate system will automatically become a part of the Federal-aid system these funds will be available for expenditure on the system.

Development of the system eventually will provide two-lane, four-lane and in some instances six-lane highways for fast-moving traffic between all cities having a population of 100,000 or more and a majority of the cities of 10,000 to 100,000 population.



RUGGED TOOLS for TOUGH JOBS

DEPENDABLE heavy duty tools for pulling and installing bearings, gears, sleeves, wheels, shafts and other close-fitting parts. Made of high alloy, drop forged, heat-treated steels, precision machined—strong, easy to handle, portable, SAFE to use, FAST-working! Approved by Hyatt, M-R-C, New Departure, SKF, Timken, and by Tractor Manufacturers.

OTC PULLERS and Attachments, BOX WRENCHES and other tools in sizes to handle practically every maintenance job.

FACTORY APPROVED CATERPILLAR SET
Essential service equipment for all CATERPILLAR Tractors; also used on other tractors and on road machinery. Other sets available to meet your needs.

Write for OTC Maintenance Bulletin showing many time-saving OTC uses.

OWATONNA TOOL CO.
319 Cedar St., Owatonna, Minn.





TRANSITS and LEVELS

HEADQUARTERS for REPAIRS — any make

We will buy or trade in old Transits Levels, Alidades, etc. Send instruments for valuation.

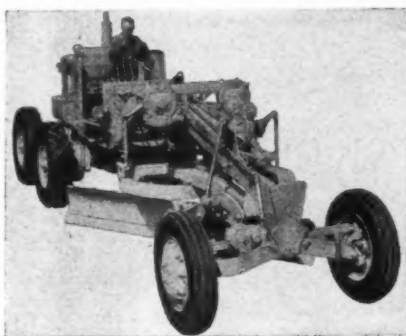
Write for new Catalogue RS-99 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

WARREN-KNIGHT CO.
Mfrs. of Sterling Transits & Levels
136 N. 12th St., Philadelphia 7, Pa.

New Construction Equipment and Materials

New Motor Graders

1. Featuring a distinctive high arch front axle, three new motor graders have been introduced by the J. D. Adams Manufacturing Co., Indianapolis, Ind. Products of more than 5 years of intensive research, each machine embodies improvements and refinements developed, tested, and proved under severe war and peace-time operating conditions. The three models are known as the No. 512 (extra-heavy duty), the No. 414 (heavy duty), and the No. 312 (medium duty). It is claimed that the high arch front axles giving greater axle clearance provide approximately



The Three New Adams Motor Graders are of the same overall design.

twice the capacity of conventional axles for straddling large windrows, and that bulldozing of axles through material is eliminated. All three Adams motor graders are powered by International Diesel engines, available with cab controlled push-button starting, and have a range of 8 forward and 2 reverse speeds. The three models are identical in overall design which gives each machine the same wide range of blade positions, adaptability to all types of surface, ditch and bank work and ability to do any work in proportion to its size and power. Materially improved steer-



ing is accomplished by the use of tapered roller bearings and an entirely new design incorporated in the front axle. Special bulldozers and snow plows have been designed as optional equipment for all three of the new graders.

New Portable Apron Feeder

2. A new portable apron feeder has been announced by Pioneer Engineering Works, Inc., Minneapolis, Minn. This is a portable conveyor for heavy, sharp, abrasive rock and similar materials for which a belt conveyor is impractical. This long feeder, mounted on its own chassis and wheels, with hopper attached, can be swung into place quickly for short-time set-ups. The feeder, now made in the 36 in. width and measuring 30 ft. from center to center of head and tail shafts, is

New Portable Apron Feeder

supported on a single axle equipped with dual pneumatic tires. Steel wheels are optional.

The frame is built from rolled channels, truss braced to prevent weaving and distortion under load. Feeder pans are 1/2 in. thick forged steel plate, with overlapping corrugations to give added strength against impact and load and to prevent slippage of material. Malleable castings are bolted to the ends of the pans and are interlocking to prevent spillage at the sides. Sideboards adequately braced are designed to further prevent spillage and leakage at the sides. The pans are carried by three steel chains riding on hardened rollers. Three steel sprockets carry the chains at the head and tail ends. Return idlers support the pans under the feeder. Drive is from the crusher to the feeder head shaft through a clutch and built-in gear reduction.

Mail Inserted Card

for data on equipment described on these pages. See also inquiry blank on page 127.

New American Camera Transit

3. Simplicity of design and practicability of appliance have been given first consideration in the new camera transit now in production

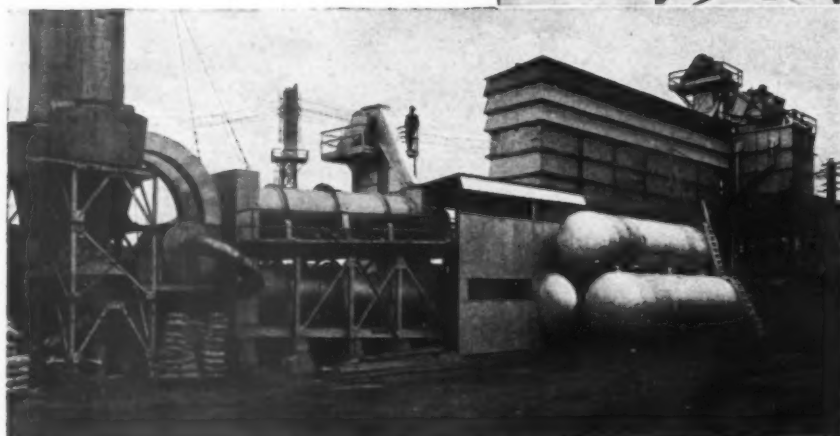
by Fairchild Camera & Instrument Corporation, Jamaica, N. Y. A combination of a camera of special design and a transit, the instrument was developed to meet specification of the U. S. Navy Hydrographic Office. The Fairchild unit consists of a Type 5078-E K&E transit combined with a 4 in. x 5 in. plate camera. To provide sufficient mounting space for the camera, the telescope and standards were removed from the transit and a wide aluminum base plate was fitted around the base of the compass box and fastened to the upper limb of

the transit. This new plate permits the standards to be separated so the camera can be mounted between them on the axis normally occupied by the telescope. The telescope itself is mounted on the top of the camera with its optical axis parallel with the optical axis of the camera. The camera is made of aluminum alloys to keep the weight of the unit as low as possible. It is equipped with an 8¼ in. of 6.8 Goerz Aerotar Lens and provides 4 in. by 5 in. negatives on glass plates.



New Fairchild Camera with Transit

**from the smallest
portable plants to
the largest
stationary models**



Trouble - Free, Economical Performance



THE MOTOR-PAVER

This complete traveling mixer and paver — self-contained and self-propelled — mixes, spreads and lays any type of mixed-in-place bituminous material to any width, thickness and crown condition. Write for Bulletin MP-46.

Dependable performance — under the wide variety of operating conditions, is engineered and built into every H and B Asphalt Plant. As America's first builders of bituminous mixing machinery, Hetherington & Berner take pride in building equipment that will do a good job and prove a good investment for its owner. Every H & B plant is completely erected and checked at our factory before shipment.

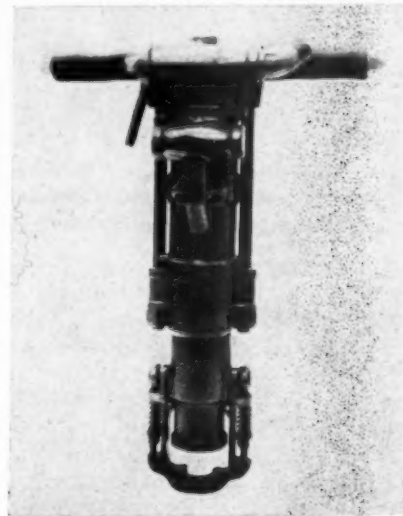
H & B builds portable and stationary plants of all types, sizes and capacities. Write for literature on the type and size of plant in which you are interested.

HETHERINGTON & BERNER INC.

721 Kentucky Ave.,

FOR BEST RESULTS — BATCH MIX — HOT MIX

Indianapolis 7, Indiana



Schramm D-45 Rock Drill

New Weed Killer

4. A new weed killer, Dynitro, especially designed for use on roadsides, ditches and canal banks, has been announced by Howard Hanson & Co., Beloit, Wis. The new product is stated to kill outright most annual weeds and also to kill the above-ground foliage of perennial weeds and grasses. It does not sterilize the soil. By permitting regrowth, the soil-protecting ground cover is maintained, thus protecting against possible erosion.

New Rock Drill

5. A new rock drill, D-45, added to the line of Schramm Inc., West Chester, Penn., is operated by a new type valve (patented), which is claimed to be lighter and faster

than other valves. The drill is made of drop forgings throughout. All parts are of special analysis steel, heat treated for their particular

function. It has a new quick acting rugged retainer. The exhaust ports are so arranged to divert the exhaust away from operator, also they are of ample size to prevent freezing in the most severe weather. The drill can be furnished in dry blower and wet type for $\frac{7}{8}$ in. or 1 in. steel.

New Front End Loader

6. A new small tractor loader with a $\frac{3}{8}$ or $\frac{1}{2}$ yd. bucket and dumping clearance of 96 in. has been announced by American Tractor Equipment Corporation, Oakland, Calif. This new loader, the ATECO Model L-HG, is built for mounting on Cletrac HG42 track-type tractor. The L-HG has an overall height of 90 in. in digging position and 60 in. when bucket is in carrying position. Bucket raises to clear 108 in. before dumping, and has a clearance



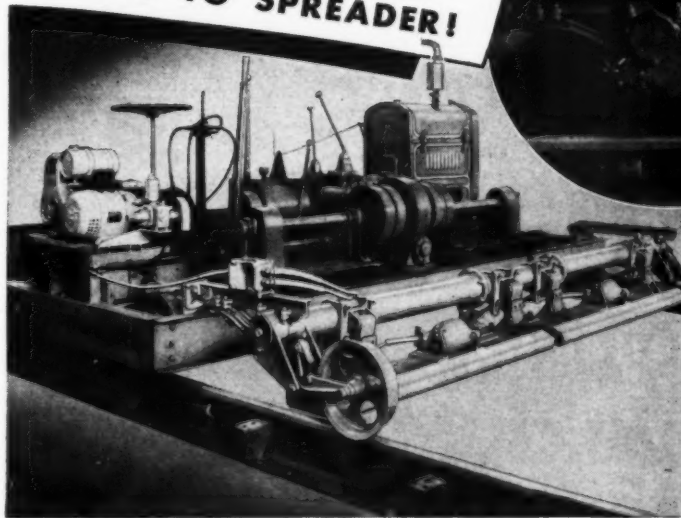
Model L-HG Front End Loader

of 96 in. after bucket is dumped. The bucket pivot point is a few inches back of load center, thus increasing dumping distance. Bucket carrying frame is mounted so there are no uprights or superstructures to obstruct operator's view of work. A built-in radiator guard protects front end of tractor, and serves as oil expansion chamber, so preventing oil overflow and loss. Two double-acting hydraulic rams, powered by a front-mounted pump, raise and lower the bucket. The pump supplies constant power with tractor clutch in or out. Entire unit, including loader, hydraulic pump and tractor, weighs but 5250 lb. Bucket is easily and quickly interchanged with bulldozer bowl or angle bowl attachment. Angle bowl can be used in either straight position for bulldozing, or angled 20 degrees for backfilling.



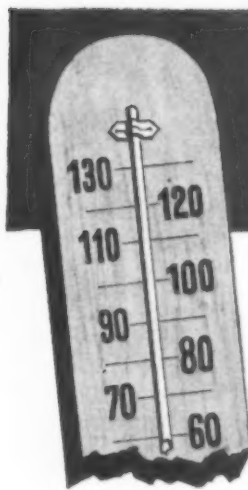
PASTE this in YOUR HAT

**JACKSON
VIBRATORY**
PAVING TUBES
CAN BE QUICKLY
CONVERTED TO
TRAILER TYPE,
SURFACE VIBRATORY
UNITS FOR ATTACH-
MENT TO SPREADER!



When specifications call for surface vibration immediately following a spreader, don't forget that your JACKSON Vibratory Paving Tube can be quickly and inexpensively changed to fully meet those requirements. All that's necessary is to substitute the two vibratory units shown in the illustration, for the vibratory tube and attach to the rear of the spreader by means of the hinged connections. Each vibratory unit is equipped with one or more vibratory motors of 3600 - 4200 frequency, is independently suspended and adjustable for crown and working height. Widths can be furnished to suit job. Width changes can be easily made by use of inserts. Thus the JACKSON becomes double functioning and eliminates the necessity of buying an extra machine. See your JACKSON distributor or write for further information.

Manufactured by ELECTRIC TAMPER & EQUIPMENT CO. for
JACKSON VIBRATORS INC. Ludington, Mich.

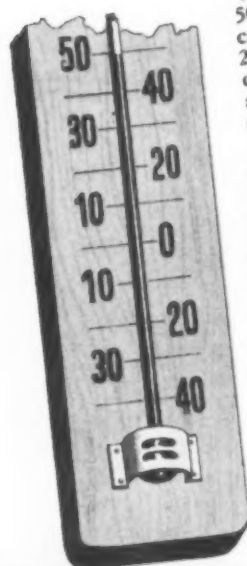


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Use Calcium Chloride In All Concreting

BELOW 50 DEGREES



When the temperature drops from 70 degrees to 50 degrees, it takes twice as long for normal concrete to acquire specified strength. But by using 2 pounds of calcium chloride for each bag of cement, this lag in gaining strength is overcome, and normal strength is attained in the same time as during the summer months.

Use calcium chloride in all Portland Cement Concrete when a temperature drop to 50° or below is indicated within 24 hours, and get back on normal 70° summertime operating schedules for placing, finishing, removal of forms, and opening for use. At freezing temperatures when covers and artificial heat are necessary, calcium chloride reduces the time this protection is required.

Concrete with calcium chloride has greater strength at all ages tested.

Get your copy of the new book, "Calcium Chloride in Concreting," explaining methods, amounts to use and results of tests by the National Bureau of Standards.

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CRUSHING, SCREENING and WASHING UNITS

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Crushers	Bins	Drag-Lines
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Types for crack sealing,
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ing waterproofing,
sprinkling road oil,
and any special types
to your order.

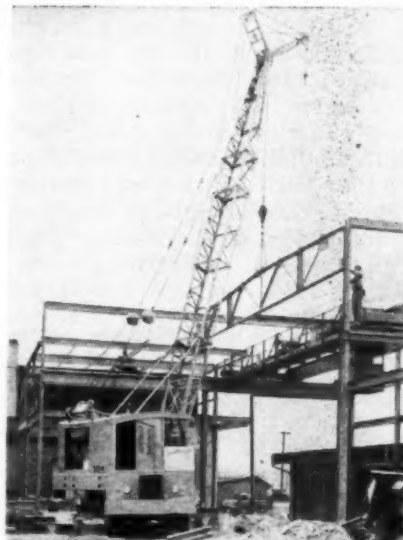


TARRANT MFG.
Company
Saratoga Spa
N. Y.

New Truck Crane

7. A new truck crane having a lifting capacity of 40,000 lb. with outriggers and 15,800 lb. without outriggers (both 85% ratings) has been announced by Koehring Co., Milwaukee, Wis.

The same base machine used by Koehring on their 304 crawler model is utilized on this 304 truck crane. Hinged boom folds easily,



Koehring 304 Truck Crane

saves time whenever the machine is moved. Pendant boom suspension simplifies changes in boom length and materially reduces the cost of boom suspension cable. Booms are available in lengths up to 110 ft. Jib boom extensions are offered in 15 ft. to 30 ft. sizes. Removable outriggers are optional, permit efficient operation as a shovel, pull shovel or dragline.

New Winches

8. A new series of single lever track and tractor rapid reverse winches, originally developed for the armed forces, is now being offered the civilian market by Gar Wood Industries, Inc., Detroit, Mich. Three sizes are currently in production: 15,000, 30,000 and 60,000 lb. pull. Instantaneous change in direction is achieved in this series at full load and under full speed by a single straight-line shift without engaging or disengaging the engine clutch. Use of the engine clutch is necessary only at the beginning and end of the job to engage and disengage the power take-off. The reversing mechanism consists of a double-ended modified jaw clutch sliding on splines or an input shaft which

meshes with clutch gears on either end of the shaft. The shock of engagement at full load and speed is absorbed by a torflex sprocket with rubber bushing. The winches lend themselves readily to remote control: the operating levers can be placed anywhere on the truck and can be operated by hand power, vacuum or air. Gar Wood also has announced a new line of worm-gear tractor winches for use with Allis Chalmers tractors. The AC series is designed for heavy duty, slow-speed towing, and is made in three models with a maximum line pull of 60,000 lbs.

New Mower

9. A new self-propelled mower with a 3 ft. cutter blade stated to be especially useful for cleaning up highway right of way, around culverts, guard rails, and highway signs and intersections — areas too small for large machines — has been placed on the market by



New Mower

James Cunningham Son & Co., Rochester, N. Y. The mower is powered by a 1½ HP engine. It has throttle control on hand bars, and a main clutch control for forward travel and knife drive. The throttle control provides travel speed adjustment from a slow walk on up to full speed.

New Heavy-Duty Trucks

10. Three new heavy-duty trucks, each available in 10 different models, have been announced by the Dodge Division, Chrysler Corporation, Detroit, Mich. The 30 new Dodge truck models are available in 60 gross vehicle weight classifications ranging up to 23,000 lbs. and in tractor-trailer ratings up to

Reilly

PROTECTIVE COATINGS

FOR WOOD, METAL, BRICK, CONCRETE STONE AND TILE SURFACES

● REILLY PIPE ENAMEL

For coating oil, gas, and gasoline pipe lines, water conduits, and as a lining for steel water and storage tanks, whether mobile or stationary, underground or elevated.

● REILLY COLD APPLICATION No. 40

For tanks, structural steel and other metal surfaces exposed to the atmosphere and to corrosive gases.

● REILLY COLD APPLICATION No. 5

For tanks and other metal designed for underground or underwater service. Also an excellent water-proofing agent for concrete.

● REILLY COLD APPLICATION No. 50

For metal, tile, stone and concrete surfaces that are subject to erosion, corrosion, or the action of either fresh or salt water.

● REILLY BITUMINOUS PIPE DIP COMPOUND

For hot-dipping cast iron pipe and fittings.

● REILLY RESISCOTE

A corrosion-resisting paint, available in colors. For use on internal combustion engines, steel pickling houses, water works and sewage plants.

● REILLY CREOCOTE

For painting creosoted wood block floors, poles, guard rails, posts and other creosoted surfaces. (Available in colors.)

● REILLY ALUMINUM COATING

One coat gives dependable protection and beauty to metal, cement, brick, tile and wood surfaces. Heat-resisting, surface protecting, beautifying.

● REILLY TRANSOTE

A transparent, stainless wood preservative that stops insect and fungi attacks and prevents their recurrence. Wood treated with Transote can be painted, varnished, glued or finished in any desired manner. Applied by dip, spray or pressure methods.



These coatings are fully described in a 20-page booklet which will be sent on request.

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ASPHALT PLANTS**
High Production—Low Cost

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ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

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Shunk

GRADER AND SCARIFIER BLADES

For any type or make of machine—Motor Graders, Maintainers, Scrapers, Drags, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blazers, Carryalls, Snow Plows, Also—CUTTING EDGES, WEARING BOOTS, BACK SLOPERS, EXTENSION BLADES, MOLDBOARDS and SCARIFIER TEETH

50 years of specializing in the manufacture of Construction Equipment Blades has developed for your benefit a quality of special steel, milled through our own rolls and forged at the edges to give that extra cutting and wearing quality you need.

Furnished in various widths, lengths, and thicknesses, punched ready to fit your machine.

Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

Shunk

MANUFACTURING COMPANY

Established 1854
BUCYRUS, OHIO



37,000 lbs. The entire Dodge line, exclusive of school buses, now includes 175 gross vehicle weight models. The new heavy-duty line includes a 2½-ton truck of 18,000 lbs. gross vehicle weight in five wheelbases ranging from 136 to 235 in.; a 3-ton truck of 20,000 lbs. gross vehicle weight in five wheelbases ranging from 136 to 196 in., and a 3-ton heavy-duty truck of 23,000 lbs. gross vehicle weight in five wheelbases ranging from 136 to 196 in. Engines used in the



New 3-ton Truck

three lines were developed from engines which were proved in World War II use. The 6-cylinder engine which powers the 2½-ton line has a 3¼ in. bore and 4¼-in. stroke with 281.64 cu. in. piston displacement. Compression ratio is 6.5 to 1. It develops 115 H.P. at 3200 r.p.m. and 225 lb.-ft. of torque at 1200 r.p.m. The 6-cylinder engine which powers the 3-ton and the 3-ton heavy-duty lines has 3¼-in. bore and 5-in. stroke with 331.35 cu. in. piston displacement. Compression ratio is 6.5 to 1. It develops 128 HP at 3000 r.p.m. and 270 lb.-ft. of torque at 1200 r.p.m.

New 2-2½ Ton Roller

11. A 2 to 2½ ton roller has been added to the Pierce Bear line of Lewis Manufacturing Co., San Antonio, Tex. This is a tandem driven from within the compression roll that is claimed to roll 100% against a curb up to 24½ in. high and with-



Pierce Bear 2-2½ Ton Road Roller



LACLEDE WELDED DOWEL SPACERS

RIGID - ACCURATE

FOR CONTRACTORS, LACLEDE DOWEL SPACERS provide a light weight, economical method of placing dowels and joints. Distribution bars, supports, and dowel sleeves are all welded into one integral unit for rapid joint assembly. Shaped tie wires accurately locate fibre or steel joint materials.

FOR ENGINEERS, LACLEDE DOWEL SPACERS provide a rigid, accurate, prefabricated assembly for holding each end of each dowel in exact location. Both horizontal and vertical alignment of the dowels can be maintained on even the most irregular subgrades within limits prescribed by highway engineers.

LACLEDE STEEL COMPANY

ARCADE BUILDING SAINT LOUIS 1, MISSOURI

in 1½ in. of a high wall or building. The roller is powered by an Allis-Chalmers heavy duty industrial 4 cy. 24.5 BHP engine. The transmission is of the spur gear type with multiple disc machine tool clutches running in oil, and with anti-friction bearings throughout. The roller speed at engine speed of 1,000 rpm is 1.60 mile; at engine speed of 1,500 rpm 2.40 mile. The compression roll has a diameter and width of 36 in. by 36 in. The guiding roll is 30 in. by 32 in. Wheel base is 69 in.; length over-all 101 in.; width over-all 43 in. Compression: compression roll without ballast 84 lb. per linear in.; with full water ballast, 115 lb. per linear in. The weight is 4,500 lb. empty and 6,500 lb. with full water ballast.

New Earthmover Tire

12. A 27.00-33 earthmover casing has been added to the regular sales line of The Goodyear Tire & Rubber Co., Inc., Akron, O. Weight of the new tire is 1,482 lbs. Overall weight of tire, tube and rubber flap will total 1,627 lbs. The tire has a 24-ply rating rayon. Designed to handle unusually heavy off-the-road hauling requirements, the tire has a load rating of 31,050 lbs. at 40 lbs. inflation at 10 miles per hour.



The 27.00-33 Tire-Earthmover Type

At 25 miles per hour it has a load rating of 27,600 lbs., also at 40 lbs. inflation. Tire is being manufactured in two tread designs — All-Weather and Sure Grip. All-Weather is for both trailing and driving earthmoving operations. Sure Grip's primary purpose is to deliver super traction for driving wheels. The tire fits a 5-degree taper rim with sufficient compression under the bead to prevent slippage at low air pressure.



**MOTOR
DRIVEN
SAND
and
CINDER
SPREADER**

Sold and distributed by leading Construction and Machinery Dealers throughout the United States and Foreign Countries.

THE HIGHWAY MODEL DD

The Highway Model DD Spreader permits one man to cast a uniform swath of sand or cinders 8 to 60 feet wide at truck speeds up to 35 miles per hour. Clamps onto tail gate of any standard dump truck. Simple adjustment keeps spreader in horizontal position to cast material under and ahead of rear truck wheels. Truck can travel ahead of traffic with safety. Material is fed into hopper by gravity — no shoveling required. Adjustable feed gates control thickness and direction of spread. Throttle on 1½ H.P. Briggs and Stratton gasoline motor determines width of spread. Widely used for ice control in winter, the Highway Model DD is ideal for seal coat work and dust control in summer.

Write for descriptive literature.

HIGHWAY EQUIPMENT COMPANY

605 D Avenue N.W., Cedar Rapids, Iowa

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

Stripe Streets IN A Jiffy!

Replace slow, tedious hand marking methods with faster, more efficient machine striping. An M-B Marker simplifies the job. Used by municipalities everywhere. Promotes safety . . . Adds to efficiency . . . Puts striping on a fast, low-cost production basis. Handles ANY type of striping . . . is quickly convertible to all-purpose paint sprayer. Two types available — hand-propelled and self-propelled. Write for Bulletin #121.



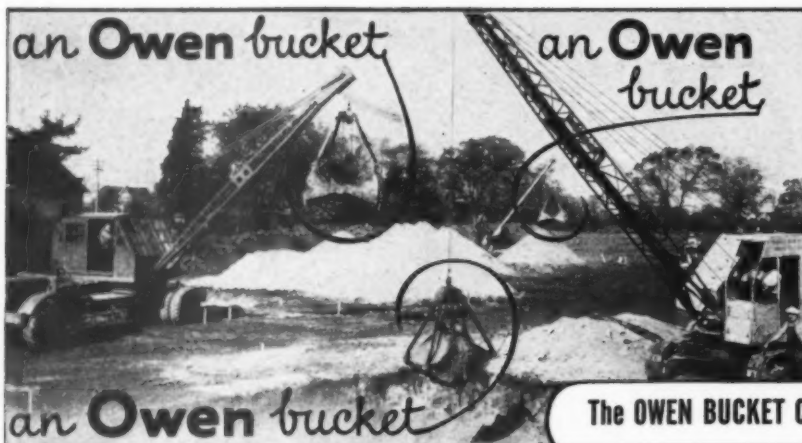
THE "Business End" OF AN M-B MARKER

Atomizing spray guns apply spray of paint between adjustable line guards. Paint goes down evenly and smoothly with more lineage per gallon of paint. Control valves within easy reach of operator.



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MARKERS



Three Owen Buckets that we can see are at work on this particular project.

Multiply this by a very large number and you'll get a partial conception of the widespread Owen standardization on the part of progressive contractors everywhere.

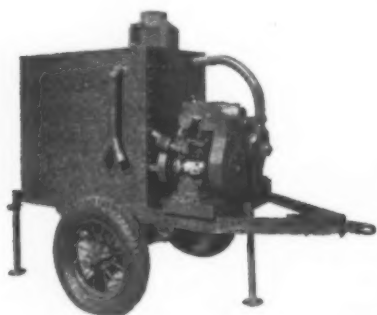
There is a new Catalog available now. You'll want to consult it we're certain. A brief line to us will bring your copy to you promptly.



The OWEN BUCKET CO. 6070 BREAKWATER AVE. CLEVELAND, OHIO BRANCHES: New York, Philadelphia Chicago, Berkeley, Calif.

DRILL without DUST

KADCO EQUIPMENT
Reduces Costs
Eliminates Hazard



Use KADCO Dust Control equipment on your rock drills for greater drilling footage—less blacksmithing—longer tool life—better working conditions. Available in a wide range of sizes for all operations. For sale or lease.

Write for information

KADCO CORPORATION
LONG ISLAND CITY, N. Y.

MANUFACTURERS' LITERATURE

Clamshell Buckets

13. Advantages of modern all-welded construction in the design of clamshell buckets are analyzed in a new 8-page booklet in color published by the C. S. Johnson Co., Koehring subsidiary, Champaign, Ill.

Twenty-nine photographs and drawings illustrate the design features. Complete specifications for all three types of the Johnson all-welded clamshell bucket — general purpose, wide-rehandling and heavy-duty digging — in sizes from $\frac{3}{8}$ yd. to $2\frac{1}{2}$ yd. are also included in the booklet.

Precast Concrete Curbing

14. Amcureb aluminum — faced precast concrete curbing is described in literature of American Standard Curb Co., Boston, Mass. This curbing comes to the job in 10 ft. prefabricated sections, ready for installation on concrete piers with patented adjustable anchor. Only the piers are built on the job. It

is claimed this curbing is cheaper to install than the usual types because of the patented method of installation. Specifications are available. Another product is Amcureb precast concrete highway edging. This consists of a precast section of reinforced concrete 4 to 6 in. wide, 10 ft. long and from 4 to 7 in. deep (depending on combined depth of binder and surface course). The edging comes to the job ready for speedy installation on piers built on the subbase.

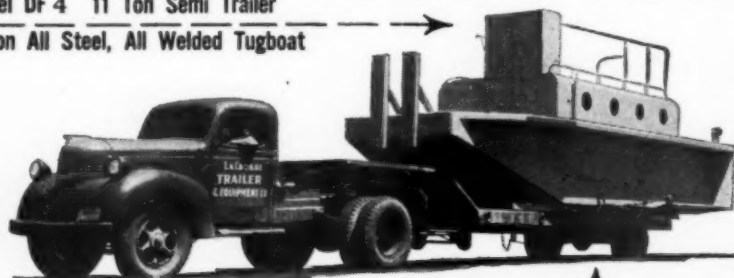
Landleveling

15. How earthmoving economies are putting into production agricultural sites once too expensive to level, is discussed in a new landleveling bulletin just issued by R. G. LeTourneau, Inc., Peoria, Ill. Pointing out the profitable market being opened up through reduced leveling costs, the 4-page folder gives 10 reasons why contractors are finding Tournapulls adaptable to landleveling jobs. It is profusely illustrated with on-the-job photos accompanied by short, easy-to-read caption-type job stories. The pamphlet also shows how Tournapull can increase profits on other jobs, such as canal, levee and dam work.



Further proof of leadership in engineering and manufacturing is shown by the La Crosse DF 4 Semi Trailer carrying the La Crosse built Mississippi Tugboat. Scientific application of proven trailer facts brings to you the durability and versatility of the complete line of La Crosse Heavy Duty Trailers. For those unusually WEIGHTY transportation problems — look to La Crosse for your answer.

Model DF 4 11 Ton Semi Trailer
9 Ton All Steel, All Welded Tugboat



LA CROSSE TRAILER CORP.
LA CROSSE, WISCONSIN

Shovel, Crane and Dragline

16. The Lima Type 802 shovel, Crane and dragline is described in a new 20-page bulletin issued by Lima Locomotive Works, Incorporated, Shovel and Crane Division, Lima, O. The bulletin features the application of "Precision" air control. Liberal space is given to specifications, capacities, working ranges and illustrations showing details of construction. As a shovel the Type 802 has a capacity of 2 cu. yd. as a crane, 40 tons, and as a dragline, variable. For operation in deep cuts or where longer reach is desired, special high-lift equipment consisting of a 34 ft. 6 in. boom, 27 ft. dipper handle, and 1¾ cu. yd. dipper can be furnished.

Brake Linings and Clutch Facings

17. Brake linings and clutch facings for construction equipment are covered in a 42-page catalog of United States Asbestos Division of Raybestos — Manhattan, Inc., Manheim, Pa. It describes the various Grey-Rock industrial linings and blocks, furnishes recommendations and installation instructions and describes various industrial applications. It contains specific lining recommendations for a wide variety of makes and models of constructions. It also contains complete clutch facing recommendations.

Hard-Facing

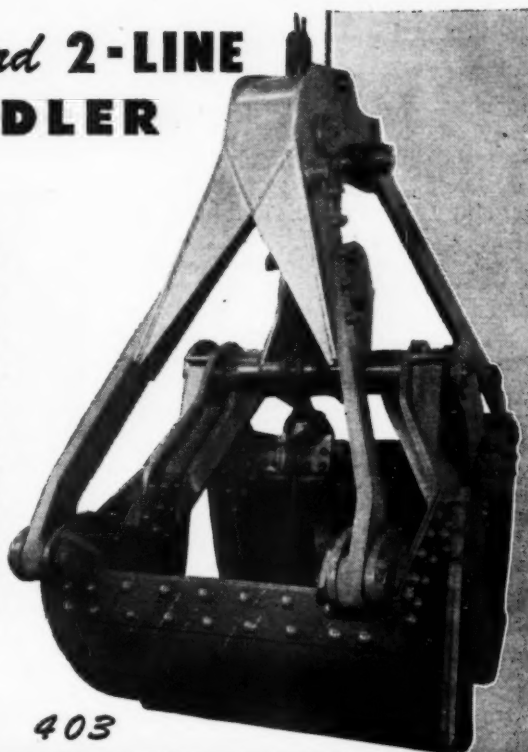
18. The Colmonoy Formweld Process used extensively by the U. S. Army for hard-facing tank sprockets and now available for general use, is described in a catalog issued by Wall Colmonoy Corporation, Detroit, Mich. The process, which is claimed to increase the life of sprockets by upwards of four times, is described in the catalog, which also contains full information on the complete lines of Colmonoy hard-facing alloys, testing from 15 to 68 Rockwell C. Typical applications are illustrated.

Diaphragm and Plunger Pumps

19. The power-driven diaphragm and plunger pumps, known as "Marlow Mud Hogs", are described in a new bulletin of Marlow Pumps, Ridgewood, N. J. These pumps are available in 3 in. and 4 in. single and 4 in. double sizes, with capacities ranging from 3000 to 9000 gal. per hour. They have the following

ERIE Standard 2-LINE REHANDLER

THIS compact Lever Arm Rehandler Bucket of normal proportions has ample closing power to fill to capacity in compact materials, and is so designed that the reeving can be adjusted to obtain maximum speed with capacity grabs in loose materials. We have reduced the "height open dimension" thus requiring minimum headroom, enabling you to pile higher and to discharge into higher hoppers. Lighter weight alloy construction provides more pay load (scoop contents) less bucket dead weight. To see this bucket in all detail write for bulletin 403.



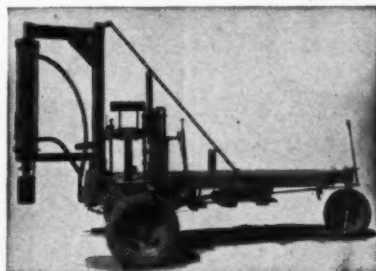
● Write for Booklet 403

ERIE BUCKETS • A Complete Line

Eric Steel Construction Co., 369 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATORS • PORTABLE CONCRETE PLANTS

RAPID!



Cuts concrete and cuts labor costs to 2½¢ per square yard. Applicable to floor work and different types of inside horizontal work.

Very efficient in maintenance work of highways. Boom folds down and readily trailed by any light truck. Make your compressor treble its output by hooking it to this machine.

Rapid Pavement Breaker Co.

1517 Santa Fe Ave.
Los Angeles 21, Calif.

CONTRACTORS RUBBER PRODUCTS

available from Stock
for immediate Delivery

CONVEYOR, ELEVATOR and
TRANSMISSION BELTING
all widths and gages

V-BELTS all sizes

HOSE

all sizes and types

AIR	DISCHARGE	STEAM
FUEL	COMPRESSOR	VACUUM
FIRE	PILE DRIVERS	SUCTION
WATER	ROAD BUILDERS	WELDING

BOOTS, DREDGE SLEEVES,
PUMP DIAPHRAGMS, ETC.

... and everything rubber
for Industrial Requirements

Write for new catalog

PHONE WRITE WGR

CARLYLE RUBBER CO., Inc.

62-66 PARK PLACE NEW YORK 7, N. Y.

Phone: BArdm 7-2121

features: Non-clogging ball valves, quickly-accessible valve chambers, renewable valve seats, powerful steel walking beams, double bushings, long-life diaphragms, clamping rings which permit diaphragms to be replaced in only 6 to eight minutes, oversized pump bodies, and extra heavy gearing.

WITH THE MANUFACTURERS & DISTRIBUTORS

Flury Appointed Factory Manager

Richard Flury has been appointed factory manager of Gemmer Manufacturing Co., Detroit, Mich. Mr. Flury, formerly chief metallurgist, has been with the company for more than a decade. He succeeds C. S. Horn, who resigned recently.



★ Ed Galvin (left) Executive Vice-president and General Sales Manager of LaPlant-Choate has a twinkle in his eye as he explains the new "LPC" rubber-tired prime mover to Frank McBath, president of Columbia Equipment Co., newly appointed distributor. McBath is also national president of the Associated Equipment Distributors.

Wire Rope Executive

Emerson H. Todd has been appointed sales manager of American Cable and Hazard Wire Rope Divisions of American Chain & Cable Company, Inc., succeeding Frank W. Bemis who resigned to enter another business. Mr. Todd, who is well known in the wire rope industry, will make his headquarters at Wilkes-Barre, Penn. He has been with the company since 1925, and for the past several years he has been Chicago district sales manager for the American Cable and Hazard Wire Rope Divisions. Prior to that he was chief engineer on wire rope at the mill in Wilkes-Barre, Penn.

George Gunther, who has been with the company prior to his service with the armed forces, from which he recently returned, has been appointed Chicago district manager for the wire rope divisions succeeding Emerson Todd. Mr. Gunther's headquarters will be at 400 West Madison Street, Chicago.

A HIGH-SPEED Mobile DRAGLINE

*that gets around
in a hurry*

MICHIGAN

MODEL TMDT-16

FINGERTIP AIR CONTROL
½-YARD CAPACITY

COMPLETELY
CONVERTIBLE

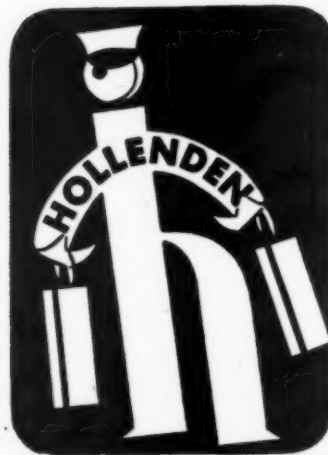


MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

IN CLEVELAND
IT'S THE



HOME OF THE FAMOUS

VOGUE ROOM

1000 ROOMS WITH BATH
RADIO IN EVERY ROOM
FIVE FINE RESTAURANTS
CENTRAL DOWNTOWN LOCATION

Ads Win Honors

R. G. LeTourneau, Inc. of Peoria, Illinois, has received for the second time this year one of the nation's highest industrial advertising honors. On June 23, the National Industrial Advertisers Association named the firm a winner in the Product Advertising Division of its 23rd Annual Conference and Exhibit. Presented at the Association's 3-day conference at Atlantic City's Traymore Hotel, the award was received by Eugene E. Weyeneth, LeTourneau Advertising Manager, with a similar one going to Arnold Andrews Advertising Agency, Milwaukee, Wis., which assisted in preparation of the winning campaign.

The only manufacturer of construction equipment to win a major award in the Products Division, R. G. LeTourneau, Inc., was honored "for the advertising campaign which, in the opinion of the Jury of Awards, is conspicuous for the excellence of its planning and execution." The firm was similarly honored April 8th by the Associated Business Papers in the Machinery and Equipment Division of their 4th Annual Business Paper Advertising Competition.

New Caterpillar Representative

Robert F. Hagerty has been named district representative for Caterpillar Tractor Co., Peoria, Ill. Mr. Hagerty will serve three distributors: Patten Tractor & Equipment Co., Chicago; Nagle-Hart Tractor & Equipment Co., Madison, Wis., and Brebner Machinery Co., Inc., Green Bay, Wis. He will also have jurisdiction over all agricultural dealers in the territories of these distributors. Territory assigned Mr. Hagerty was formerly covered by E. W. Cunningham. Mr. Cunningham will now serve Peoria Tractor & Equipment Co., Peoria, Ill., Martin-Roasa Tractor & Equipment Co., Cedar Rapids, Iowa, and Central Illinois Tractor & Equipment Co., Springfield, Ill. W. E. Leming will service John Fabick Tractor Co., St. Louis; Hobson & Co., Kansas City, and E. A. Martin Machinery Co., Joplin, Mo.



R. F. Hagerty

New FWD Distributor

Flesch-Miller Tractor Co. has been appointed distributor in southern Indiana for Four Wheel Drive Auto Co., Clintonville, Wis. The Flesch-Miller Tractor Co., with headquarters at 802 Daly St., Indianapolis, Ind., will sell and service FWD trucks in the southern part of the state. The northern part of Indiana is under contract to Jacob Rose of LaPorte, Ind., as FWD distributor.

Graver Promotes Broxham

Willard M. Broxham has been named manager of sales for the fabricated plate division of the Graver Tank & Mfg. Co., Inc. He formerly managed the concern's Philadelphia office and now makes his headquarters at the general offices in East Chicago, Ind.

West Coast Reinforcing Steel

The J. Phillip Murphy Corporation announces the new location of their Reinforcing Steel division, plant and offices, at 4300 East Shore Highway, Emeryville, Calif. Phone Piedmont 8260.



OUR invitation to subject the Davey Compressor to the acid test of comparison is backed by the fact that it will deliver its rated output over a longer period of time than any other compressor, that its long-run cost is less.

Davey guaranteed-for-life valves provide just one of the many reasons for this superiority of Davey Compressors. Davey conservative-speed operation is another big factor adding to its long, trouble-free service. Add other Davey engineering features such as welded steel frame, aluminum alloy cylinder heads and automotive type steering and you can see why we invite product comparison.

Write For Catalog E-172 for full information on the complete line of Davey Compressors, Heavy-Duty Truck Power Take-Offs and Pneumatic Saws.

D-945-20

DAVEY Compressor Co.
KENT, OHIO
DEALERS IN PRINCIPAL CITIES



The swirling, chopping action of these tines mixes the materials without displacing them on the road surface.



ARIENS
COMPANY

ARIENS AGGMIXER is designed especially for mixed-in-place construction, and to be used in connection with other general purpose road equipment, especially where aggregates are used such as all types of bitumens, cements, clays, chlorides, etc. These materials are mixed without being displaced on the road surface. It's the swirling, chopping action of the tines that thoroughly pulverizes, mixes and aerates the aggregates with the binder used—rapidly and economically. Safe and easy to operate, ARIENS AGGMIXER is adjustable to any tractor . . . made in 4 sizes normal cutting widths 4', 5', 6' and 7'.

Write for complete job facts and name of nearest distributor.

BRILLION ★ WISCONSIN

CLEARING HOUSE

FOR SALE CLIMAX GASOLINE ENGINES

NEW — model V-425, 12 cylinder 425 H.P. at 1200 RPM, gasoline engine power unit complete radiator to twin disc clutch inclusive with gasoline starting engine. Cheaply convertible to natural gas operation. Priced far below factory list, 7 units available. Dealers invited.

THE FINN EQUIPMENT COMPANY

2525 Duck Creek Road
Cincinnati 8, Ohio
Phone East 1125

FOR SALE

Mack Trucks for Sale: 15 Heavy Duty Mack Chain Drive Trucks, 8-Yard Dump Bodies, Good for Quarry & Pit Work.

DUMP TRUCK SERVICE, INC.

50 Wecker Street Buffalo (15) N. Y.

WANTED

experienced and reliable contractor, having adequate equipment for asphalt road surfacing and airport construction, to join with me in Colombia contracts. First class references required. Must have ample financial backing. Mr. F. Uribe, Apartado Aereo 182, Calif., Colombia, S. A.

FOR SALE

1—54" x 24 ft. Rotary Dryer
1—3' x 8' Seco Vibrator Screen
1—4' x 9' Seco Vibrator Screen
Good condition — Immediate Delivery.
H. J. Hagen Globe, Arizona

SALE OR RENT

New Bulldozer & Crane combination on International TD-14 Tractor. Edw. H. Ellis, Jr., 3312 Hancock Walk, Camden, N. J.

FOR SALE

Available for immediate shipment one new one-ton pugmill mixer complete with manganese liners and all paddles, roller bearings and steam or air operated mixer gate, at the reduced price of \$1500.00. Location near Philadelphia, Pa.
Box 212 Roads & Streets
330 So. Wells St. Chicago 6, Ill.

WANTED — USED MIXERMOBILE

Elevated Concrete Company
1219 Good Hope Road S. E.
Washington 20, D. C.

FOR SALE

1—Foote Paver\$3,000.00
1—Huber Roller, Gas, 10-ton—
3-wheel 1,250.00
3—Steam Tandem Rollers (Prices vary)
1—Barber-Greene Ditcher 2,500.00
2—Drott Universal Bull Clam
Shovels (New), each 500.00
1—Buckeye Sub Grader, 10'
to 12' 3,250.00
1—Iroquois Asphalt Plant 2,000
lb. box15,000.00

PHIL H. McQUIRE

P. O. Box 34, Norfolk, Va.

QUALITY

OVERHAULED EQUIPMENT

All equipment listed is owned by us, and has been overhauled in our daytime shop by experienced mechanics.

PAVING EQUIPMENT

Ransome Paver, Dual-Drum Buckeye Finegraders. For ½ and full width pavement
Jaeger Spreaders
Jaeger Finishers. Model H, full and ¾ width pavement
Blaw-Knox Finishers. ¾ width pavement

BUCKETS

Owen & Blaw-Knox. 1¼, 1½, 2½, and 3 yd. rehandling.

FORMGRADERS

Cleveland "Carr". With Waukesha Motors.

FORM TAMPERS

Jaeger (new).

PULVI-MIXERS

Seaman. With power.

ROOTERS

Isaacson & Davenport. Various Sizes.

BOEHCK EQUIPMENT COMPANY

2404 West Clybourn Street
MILWAUKEE 3, WISCONSIN

AVAILABLE — IMMEDIATELY

New Cedarapids two unit mobile crushing, screening and loading plant. Will consider lease or sale on yardage basis anywhere.

JOHN T. MOUSER,

c/o Construction Materials Co.
306 Hamilton Street, Peoria 2, Illinois

Try a Pierce-Bear on that tough job!

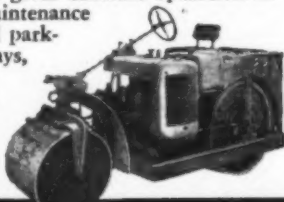


3½ TON — VARIABLE WEIGHTS

Engineered refinements and rugged strength have earned for these rollers enviable performance records. Compact design gives efficient operation in close quarters. Ideal for maintenance work on highways, airports and parking areas. Fine for driveways, docks, etc. Easy to operate. They do a good job at low cost.

Write for New Illustrated Folder.

MANUFACTURED BY



Lewis Manufacturing Co.

SAN ANTONIO 6 TEXAS

P. O. BOX
500



Concrete

VIBRATORS and GRINDERS

Write for Circular on types, sizes and Prices

ELKHART White Mfg. Co. INDIANA

Inquiry Blank and Advertisers' Index

Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to **ROADS AND STREETS**, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

Check below advertisements on which you wish information on products featured:

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American Steel & Wire Co.	43	Hazard Wire Rope Division	Third Cover	*Reilly Tar & Chem. Co.	119
*Ariens Co.	125	Heil Co.	36	Rogers Brothers Corporation	58
Armco Drainage & Metal Products, Inc.	46	Hetherington & Berner, Inc.	116	*Sauerman Bros., Inc.	96
Auto Gear & Parts Co.	53	Highway Equipment Company	121	*Servicised Products Corp.	50
*Barber Greene Co.	52	Hotel Hollenden	124	*Shunk Mfg. Co.	120
Barrett Div. (Allied Chemical & Dye Corp.)	110	Huber Mfg. Co., The	29	Sinclair Refining Co.	38
*Bethlehem Steel Co.	1	Independent Pneumatic Tool Co.	4	Standard Steel Wks.	57
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Calcium Chloride Assn.	118	*Jaeger Mach. Co., Inc.	11	Timken Roller Bearing Co.	Front Cover
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*Advertisers with * are represented in the 1945 edition of Powers Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.

Check other products below on which you wish us to obtain information for you:

- | | | | |
|--|--|---|--|
| AGGREGATE:
<input type="checkbox"/> Bins and Hoppers
<input type="checkbox"/> Conveyors
<input type="checkbox"/> Crushers
<input type="checkbox"/> Portable Plants
<input type="checkbox"/> Screens
BITUMINOUS:
<input type="checkbox"/> Batchers
<input type="checkbox"/> Finishers
<input type="checkbox"/> Distributors
<input type="checkbox"/> Dryers
<input type="checkbox"/> Heaters
<input type="checkbox"/> Plants (central)
<input type="checkbox"/> Plants (travel)
<input type="checkbox"/> Stabilizers
CONCRETE:
<input type="checkbox"/> Batchers
<input type="checkbox"/> Buggies and Carts
<input type="checkbox"/> Finishers
<input type="checkbox"/> Mixers (under 1 yd.)
<input type="checkbox"/> Mixers (1 yd. up)
<input type="checkbox"/> Pavers
<input type="checkbox"/> Road Forms (1000' set)
<input type="checkbox"/> Tower
<input type="checkbox"/> Truck Mixers
CRANES & CLAMSHELLS:
<input type="checkbox"/> Crawler Mounted
<input type="checkbox"/> Truck Mounted
<input type="checkbox"/> Piledrivers
<input type="checkbox"/> Hoists, derrick type | GRADERS:
<input type="checkbox"/> Blade, self propelled
<input type="checkbox"/> Blade, pull type
<input type="checkbox"/> Blade, under truck
<input type="checkbox"/> Elevating
LOADERS & TRENCHERS:
<input type="checkbox"/> Front-end loader (tractor mounted)
<input type="checkbox"/> Loader, bucket type and belt type
<input type="checkbox"/> Trencher or Ditcher
HAULING EQUIPMENT:
<input type="checkbox"/> Dump Trucks, self-powered
<input type="checkbox"/> Dump Wagons, tractor drawn
<input type="checkbox"/> Flatbed Trailers
<input type="checkbox"/> Other Trucks
PUMPS:
<input type="checkbox"/> Centrifugal
<input type="checkbox"/> Concrete
<input type="checkbox"/> Diaphragm
<input type="checkbox"/> Mud Jacking
<input type="checkbox"/> Piston
<input type="checkbox"/> Wellpoint
POWER UNIT:
(Independent)
<input type="checkbox"/> Gasoline
<input type="checkbox"/> Diesel
<input type="checkbox"/> Electric | ROLLERS:
<input type="checkbox"/> Power (Smooth)
<input type="checkbox"/> Pneumatic Tire
<input type="checkbox"/> Sheepfoot
TRACTORS:
<input type="checkbox"/> Crawler
<input type="checkbox"/> Rubber-Tired
TRACTOR EQUIPMENT:
<input type="checkbox"/> Dozers
<input type="checkbox"/> Power Control Units
<input type="checkbox"/> Rippers
<input type="checkbox"/> Scrapers, tractor drawn
<input type="checkbox"/> Scrapers, self-powered
BUCKETS:
<input type="checkbox"/> Clamshell
<input type="checkbox"/> Concrete
<input type="checkbox"/> Dragline
<input type="checkbox"/> Orange Peel
SHOVELS & DRAGLINES:
<input type="checkbox"/> Crawler (under 1 yd.)
<input type="checkbox"/> Crawler (1 yd. up)
<input type="checkbox"/> Truck Mounted
ROCK DRILLS & AIR TOOLS:
<input type="checkbox"/> Air Compressors
<input type="checkbox"/> Backfill Tampers
<input type="checkbox"/> Clay Diggers
<input type="checkbox"/> Concrete Vibrators
<input type="checkbox"/> Drills, cable tool | <input type="checkbox"/> Drills, tripod and wagon
<input type="checkbox"/> Drills, rock, hand-held
<input type="checkbox"/> Paint Sprayers
<input type="checkbox"/> Paving Breakers
<input type="checkbox"/> Riveters and Chippers
MISCELLANEOUS:
<input type="checkbox"/> Buildings, portable
<input type="checkbox"/> Earth Drills, power
<input type="checkbox"/> Light Plants
<input type="checkbox"/> Lubrication, Service Truck
<input type="checkbox"/> Mowers, field
<input type="checkbox"/> Power Saws
<input type="checkbox"/> Soil Stabilizers
<input type="checkbox"/> Snowplows, rotary
<input type="checkbox"/> Snowplows, v or wing
<input type="checkbox"/> Spreaders, sand or cinders
<input type="checkbox"/> Street Flushers
<input type="checkbox"/> Street Sweepers-brooms
<input type="checkbox"/> Welders (or cutting torch)
<input type="checkbox"/> Hydraulic Jacks
<input type="checkbox"/> Hydraulic Control Equipment
<input type="checkbox"/> Hand Tools |
|--|--|---|--|

Be sure to fill in name and address below:

Your Name..... Title.....
 or profession.....
 Name of your company.....
 or governmental department.....
 Type of work for which.....
 equipment will be used.....
 Street Address.....
 City..... State..... County.....

QUICK...SAFE... INTERCHANGEABLE For ALL TYPES OF PNEUMATIC TOOLS



"AIR KING"

Quick-Acting, Universal Type

HOSE COUPLING

With Auxillary Locking Arrangement

The "Air King" is a quick-acting coupling with a reputation for efficiency and safety on all indoor and outdoor air hose jobs. Shanks of hose ends are long, amply corrugated and smoothly finished, permitting easy insertion in the hose and providing a tight grip under clamp pressure.



Threaded I.P.T.
Male End

Threaded I.P.T.
Female End

Locking heads are identical for all sizes of hose and threaded pipe ends, permitting coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings or extra fittings. Made of malleable iron or bronze.

PATENTED LOCKING ARRANGEMENT

This feature, designed for services of a hazardous nature or those involving excessive vibration, makes it impossible for the coupling to come apart until manually released.

Sizes: Hose Ends — $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " and 1"; Pipe Ends — $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1"

Stocked by Manufacturers and Jobbers
of Mechanical Rubber Goods.

IF IT'S A  PRODUCT
IT'S DEPENDABLE

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO, BIRMINGHAM, LOS ANGELES, HOUSTON

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45 TONS

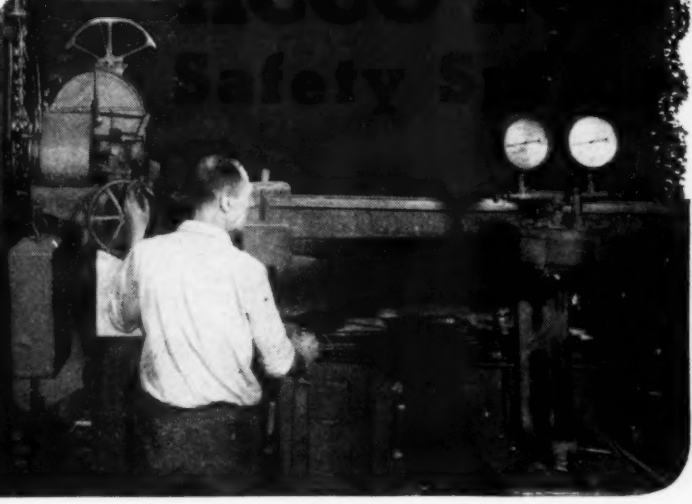
but it didn't

faze

ACCO-LOC
Safety Splices



PITTSBURGH TESTING LABORATORY



PITTSBURGH TESTING LABORATORY

PITTSBURGH, PA.

LABORATORY NO. 365283
FILE NO. 11209.19

REPORT

July 14, 1945

Subject: Wire rope assemblies made of 6x19 PREFORMED Improved Flow Steel Wire Ropes with Independent Wire Rope Center with ACCO-LOC SAFETY SPLICE Loop on each end.
Reported to: American Chain & Cable Co., Inc., Wilkes-Barre, Pa.

TEST NO.	ROPE DIAMETER	ACTUAL BREAKING STRENGTH	MINIMUM REQUIRED BREAKING STRENGTH	TYPE OF FRACTURE
1	3/8"	14,680#	12,800#	4 strands & center
2	3/8"	14,600#	12,800#	4 strands & center
3	3/8"	14,600#	12,800#	4 strands & center
4	1/2"	28,010#	22,400#	4 strands & center
5	1/2"	28,800#	22,400#	4 strands & center
6	1/2"	28,050#	22,400#	4 strands & center
7	3/4"	51,250#	49,900#	3 strands & center
8	3/4"	50,900#	49,900#	4 strands & center
9	3/4"	51,750#	49,900#	3 strands
10	1"	91,000#	87,600#	4 strands & center
11	1"	94,550#	87,600#	3 strands & center
12	1"	95,050#	87,600#	3 strands & center

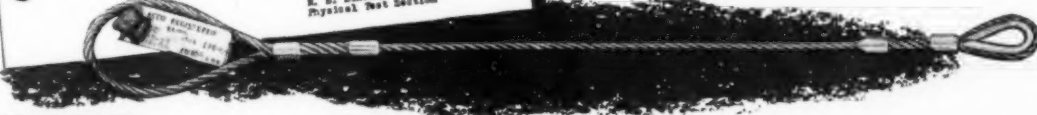
RESULTS:
1. All specimens exceeded the minimum required breaking strength.
2. After testing, all ACCO-LOC SAFETY SPLICES were intact. None showed visible deformation.

NOTES:
1. All minimum breaking strengths from Federal Specification RR-2-57a for Wire Ropes, dated May 6, 1945. Reference Table XXIV for 1/2", 7/8" and 1" dia. wire ropes.

2. For tests 1 to 9 and 12 inclusive speed of testing machine 1-1/2" per minute.
3. For tests 10 and 11 speed of testing machine 7/16" per minute.

PITTSBURGH TESTING LABORATORY
H. H. Lincoln
Physical Test Section

3/8" to 1" TRU-LAY Preformed wire ropes, equipped with ACCO-LOC Safety Splices, pulled to destruction — without the slightest effect on the rope terminals. That test was made by the Pittsburgh Testing Laboratories. But it is in the thousands of plants where ACCO-LOC Safety Splices are daily proving their 100% efficiency that the test of true worth is appreciated. — Compact, neat, flexible, made without distortion of rope structure, the ACCO-LOC Safety Splice is a revolutionary advance for wire rope endings. Send today for fully detailed literature.



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